

INTERNATIONAL COURT OF JUSTICE

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CASE CONCERNING  
AERIAL HERBICIDE SPRAYING  
(ECUADOR v. COLOMBIA)

REJOINDER OF THE  
REPUBLIC OF COLOMBIA

VOLUME IV

ANNEXES 34 - 55

1 FEBRUARY 2012



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**Annex 34**

**MINISTRY FOR THE ENVIRONMENT, TECHNICAL OPINION N° 1059,  
24 SEPTEMBER 2003**

*(Archives of the Colombian Foreign Ministry)*





REPUBLIC OF COLOMBIA  
MINISTRY OF ENVIRONMENT, HOUSING AND TERRITORIAL  
DEVELOPMENT

OPINION No: 1059

24 Sep 2003

FILE: 793

ENTITY: ANTI-NARCOTICS DIRECTORATE – DNE

PROJECT: Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate –PECIG

REF: MODIFICATION TECHNICAL CONCEPT No. 1015,  
DATED SEPTEMBER 15, 2003

|                      |
|----------------------|
| <b>1. BACKGROUND</b> |
|----------------------|

- 1.1 The Ministry of Environment, per Resolution No. 1065 of November 26, 2001, ordered the National Narcotics Directorate (DNE) to implement the ENVIRONMENTAL MANAGEMENT PLAN for the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate –PECIG.
- 1.2 Per Resolution No. 108 of January 31, 2002, the Ministry of Environment confirmed Resolution No. 1065 of November 26, 2001, except Records No. 4, 7 and 8 of the Environmental Management Plan, which are described in the mentioned Resolution.
- 1.3 Per Resolution No. 099 of January 31, 2003, the Ministry for Environment, (now Ministry for the Environment, Housing and Territorial Development), amended in part Resolution No. 1065 of November 26, 2001.
- 1.4 The National Narcotics Directorate, per communication filed under No. 3111-1-12366 of August 12, 2003 submitted to the Ministry an amendment to the Environmental Management Plan ordered per Resolution No. 1065, 2001.

|                          |
|--------------------------|
| <b>2. CONSIDERATIONS</b> |
|--------------------------|

2.1 General Considerations

The establishment of illicit crops, mainly developed in fragile ecosystems and of biological diversity relevance for the country, is a determinant in the processes of environmental damages faced by the

country, mainly due to land suitability, an activity associated with slash-and-burn of natural vegetation.

[Page 1]

The National Narcotics Directorate has indicated that the Anti-Narcotics Police, as executor of the Program for the Eradication of Illicit Crops with Glyphosate, faces permanent risks in eradication activities due to the presence of outlaw groups that harass and attack aircraft during aerial applications of Glyphosate herbicide, which in many cases prevents the appropriate implementation of the environmental management Records.

This situation has been verified by the Ministry during EMPS's follow-up activities where the Eradication Program operates, evidencing also the existence of strategies used by illicit growers to avoid spraying of areas planted with coca. Among them is the interspersing of licit with illicit crops, the fractionated planting of illicit crops, the laying of wires between trees to snare aircraft as it descends, and the presence in isolated tree-plots of considerable height, with the purpose of impeding the maneuverability of the aircraft performing the spray, being these last two situations, events that endanger the lives of the pilots and in some cases force to change the parameters of the operation of the program.

Taking into account that the Colombian government implemented an Illicit Crop Eradication Program with Glyphosate herbicide as a State strategy to fight drug trafficking and stop the devastation that the implementation of illicit crops is causing in the country and that this activity can generate effects on health and environment, the Ministry ordered the National Narcotics Directorate (DNE) to implement the Environmental Management Plan, to prevent, mitigate, control, compensate and correct any negative environmental effects or impacts.

The Environmental Management Plan ordered by the Ministry in November, 2001 was designed and submitted in due time by the National Narcotics Directorate. Its execution during this time, has allowed DNE to prove the existence of some difficulties of technical and logistical nature, which limit the effective development of the activities contemplated in the programs proposed.

Since the Environmental Management Plan is a dynamic tool that can be adjusted according to the characteristics of the activity and the environmental conditions where it is implemented, the adjustment

document submitted by DNE proposes a consistent strategy in the restructuring of the 13 Records that comprise the current Environmental Management Plan, in such a way that it allows effectiveness in execution and environmental control over the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate –PECIG.

DNE's proposal is based on experience gained during the implementation of the Program and application of environmental management records, which has allowed to identify that some of them can be integrated, to the extent that they contain similar scope and objectives; the integration and synthesis of the Records proposed by DNE, will allow greater control in the development of environmental management measures consistent with PECIG and the improvement of the coordination relationships with the various entities involved in the Program.

Additionally, DNE indicates that the characteristics of the activity to eradicate illicit crops requires a dynamic EMP that facilitates the effective implementation of proposed activities, according to the various environmental, social and security conditions that arise in the country.

[Page 2]

## **2.2 Comments on the content of the proposed Sheets**

The interdisciplinary technical review made to the modification proposal of the Environmental Management Plan's Records of PECIG, leads to the conclusion that it does not alter the overall objective to be pursued, such as prevention, mitigation, control, compensation and correction of potential effects or adverse environmental impacts that the eradication activity may generate, meaning the proposal as a logistical and technical adjustment to the current plan.

However, the review enables the Ministry to make the following comments on each Record, including:

- ***RECORD 1. MANAGEMENT PROGRAM OF SPRAYING OPERATIONS.*** *Incorporates Records No. 1 - Management of spraying operations with No. 6, Inspection, Verification and Control program of spraying operations, adjusting some objectives and activities of same.*

## COMMENTS OF THE MINISTRY

The Ministry considers it desirable to unify these two Sheets, as the objectives and activities proposed in the current EMP are related, and therefore, the proposed Records meets the environmental requirement for the management of spraying operations.

### 1. Detection Measures

The detection measures are directed at the identification process, characterization using geographical coordinates of the areas affected by illicit crops and exclusion zones of the Program; characterization will be supported with satellite imagery, aerial photography and mapping.

### 2. Operating Parameters

Based on the operating parameters, DNE in this Record modifies the maximum height of application, a situation that could cause drift effects. There are particular circumstances that put pilots' lives at risk, as well as ground conditions that require higher spraying and explain the action, when it is strictly necessary. In this sense, application parameters as droplet size increase, pilot experience, adjustment of application strip and low wind speeds should be issues to consider according to ICA's recommendations to reduce this effect, which although temporary, is negative.

### 3. Verification

In Paragraph 3.2.3. Verification, DNE states in this Record that aerial spraying must be verified in order to prove its efficiency, that is, whether it achieves its ultimate goal of destroying illicit crops.

For the purposes of the environmental monitoring and assessment which this Ministry requires, it will be necessary to evaluate the efficiency and effectiveness of environmental management measures. [Page 3]

Regarding buffer strips, in visits made by this Ministry in furtherance to the follow-up and verification of environmental

measures and quarterly reports of PECIG's activities submitted by DNE, it has been observed that the drift effect is minimal and no damage has been caused outside these strips. Therefore, we accept the amendment submitted by DNE in that we welcome those indicated in Decree 1843 of 1991 of the Ministry of Social Protection (formerly, Health Ministry).

- **RECORD 2. COMPREHENSIVE SECURITY PROGRAM IN OPERATING BASES.** *Incorporates Records No. 2 - Glyphosate Management Program and its coadjuvants in operating bases, Record No. 3. Fuels, Vehicles, Equipment and Transportation Management Program, and Record No. 11 Comprehensive Security in the bases of operations of the current plan.*

#### COMMENTS OF THE MINISTRY

The Ministry considers it appropriate to integrate activities that were distributed in the merged Sheets, to the extent that efforts and resources are concentrated to better fulfill the proposed objectives. The implementation of this Sheet and others that make up the Environmental Management Plan, must take into account the regulation included in their content as well as that which supplements or modifies same.

- **RECORD 3. PROGRAM FOR SOLID WASTE MANAGEMENT.** *Corresponds to current Record 4. Program for Solid waste management.*

#### CONSIDERATIONS OF THE MINISTRY

This Record maintains its structure with respect to current Record No. 4, Program for Solid Waste Management. This Program will apply regulations set forth in Decree 1713 of 2002, Resolution 2309 of 1986 and Decree 1843 of 1991.

- **RECORD 4. WASTE WATER MANAGEMENT PROGRAM IN PECIG'S BASES.** *Corresponds to current Record No. 5. Wastewater Management Program.*

## COMMENTS OF THE MINISTRY

This Record maintains the structure of Sheet No. 5 of current EMP, Wastewater Management Program. Discharge control, provisions of decree 1541 of 1978 and 1594 of 1984 will apply.

- **RECORD 5. ENVIRONMENTAL MONITORING PROGRAM** Incorporates Record No. 7 – Research Program in Representative and Demonstrative Plots and Record No. 8 – Environmental Monitoring Program of current EMP.  
[page 4]

## CONSIDERATIONS OF THE MINISTRY

The objectives contained in Record No. 7 of the Plan to be amended, as are the study of regeneration and ecological dynamics of sprayed areas and the determination of glyphosate residues in soil and its damage on physical-chemical properties of same, are included in the proposed Sheet to be implemented in real conditions of soil in each nucleus of PECIG's operation. In this sense, this evaluation will be done simultaneously with the environmental monitoring described in the proposed Record.

Record No. 8 – Environmental Monitoring on water, soil, vegetation, land use and health of population components in sprayed areas, aims to monitor the impacts caused on these components.

The proposed Record contains indicators provided for In Resolutions 1065/2001 and 108/2002 and complements with others as follows:

Soil: pH, Cation-Exchange Capacity (CEC), Ratio of exchangeable bases, nitrification (Nitrates, ammonium, nitrite), Texture, Concentration of Glyphosate and AMPA, phosphate solubilizers, Percentage of Organic Matter, Total and available Phosphorous, Nitrogen fasteners, bacteria count, fungi, actinomycetes (these last three are additional). It excludes earthworm analysis, taking account that toxicity of Glyphosate active ingredient is mild, according to existing literature.

Water: Glyphosate and AMPA concentration, pH, electrical conductivity, temperature, dissolved oxygen, chemical oxygen demand, nitrification (Nitrates, ammonium, Nitrites), dissolved phosphate, magnesium and calcium. Turbidity and color parameters are excluded since they are not considered representative for impact assessment of active ingredient: Glyphosate.

Sediments: This Record excludes the analysis of this component, since taking of sample is time consuming and requires complex equipment, which for reasons of security, logistics and public order it is not possible to do. Given the logistical issues and risks to personnel, this Ministry considers it appropriate not to sample sediments.

The Ministry welcomes DNE's proposal to conduct regeneration and ecological dynamics studies of sprayed areas and the determination of the residual glyphosate in soil and its effect on the physical-chemical properties of same, under real load conditions, for each PECIG's operation nucleus.

The proposed Record includes the following activities and people responsible for same:

1. Analysis of Plant Succession

- Aerial photography and videos by the Anti-Narcotics Police, as part of the environmental monitoring whose results will be submitted to the Ministry of Environment.
- Multitemporal analysis of vegetation, which is the product of the SIMCI project (Illicit Crops Integrated Monitoring System) led by the Ministry of Interior and Justice which will send results to the Ministry of Environment.

2. Residue analysis of Glyphosate and AMPA

- Monitoring Planning: will be done with the participation of the National Police, Anti-Narcotics Directorate, National Health Institute and Agustín Codazzi Geographic Institute of Colombia (IGAC).

- Water and soil sampling and packing of same, by IGAC's technicians in soil and INS or by the entity assigned by the INS for the purpose, in water resource.
- Submission of samples to laboratories by technicians who collected the samples.
- Laboratory tests and results will be made by IGAC and INS, in soils and water, respectively.
- Comparison of results for nucleus and frequencies specified in the Record and submission to the Ministry of Environment by DNE.

• **RECORD. COMMUNICATION AND SOCIAL MANAGEMENT PROGRAM.** *Incorporates Record No. 9 – Social management Program, Record No. 10, Education and Communication Program, No. 12 Environmental Management and Inter-institutional Coordination Program.*

#### COMMENTS OF THE MINISTRY

The Ministry authorizes the amendment and integration of the Sheet proposed by the National Narcotics Directorate.

• **RECORD 7. PUBLIC HEALTH PROGRAM.** *Corresponds to Health care activities included in Sheet No. 9 – Social Management Program of current EPM. This Sheet is added to the EMP as a new Public Health Program.*

#### COMMENTS OF THE MINISTRY

This Record is included in the EMP document to be evaluated as a new Program, which includes health care activities included in Record No. 9 – Social Management Program of current Plan. The content of this Record is the



result of an agreement reached by the Ministry of Social Protection, DNE and DIRAN. It currently has a budget for its implementation and is being developed by the National Health Institute (INS). This Record is the responsibility of the Ministry of Social Protection.

- **RECORD 8. CONTINGENCY PLAN.** *Corresponds to current Record No. 13. – PECIG’s Contingency Plan.*

#### COMMENTS OF THE MINISTRY

This Sheet replaces current Sheet No. 13 of EMP which also corresponds to PECIG’s Contingency Plan; it maintains the structure of the previous plan and states responsibilities in a more precise manner.

### 3. TECHNICAL OPINION

After an assessment made to the amendment document of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate -PECIG , the Ministry is of the opinion:

1. From the technical and environmental point of view, it is viable to amend the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate -PECIG - according to the proposal submitted by the National Narcotics Directorate (DNE) in the communication referred to above and taking account of the following conditions:
  - a. The entities responsible for the compliance with the Environmental Management Plan Records must submit semiannual reports describing all activities undertaken in the EMP, including training programs developed during this period, specifically detailing the activities undertaken to comply with the buffer strips on environmental issues.
  - b. DNE must submit, within 60 days, the schedule and the General Budget for the amended Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate –PECIG.

c. The dosage authorized by ICA and accepted by the Ministry per Resolution 099 of January 31, 2003 is maintained.

End of opinion

|  |   |  |
|--|---|--|
| [Signed]<br>JOSE AGUSTIN ZEA PEREZ<br>Contractor | [Signed]<br>PAMELA OCAMPO<br>Contractor | [Signed]<br>DORA MARLEN VEGA<br>Contractor |
|--|---|--|

Reviewed by:

[Signed]  
JAIRO HOMEZ SANCHEZ  
Counsel

[Signed]  
SERGIO ALBERTO CRUZ F

Aproved  
[Signed]  
GUILLERMO ACEVEDO M  
Advisor to Deputy Minister

**Annex 35**

**MINISTRY OF HEALTH,  
TOXICOLOGICAL OPINION N° LP – 0173 – 93, 2 APRIL 1993;  
TOXICOLOGICAL OPINION N° MP – 12118 – 2001, 5 NOVEMBER 2001;  
TOXICOLOGICAL OPINION N° LP – 12499 – 2002, 29 APRIL 2002**

*(Archives of the Colombian Foreign Ministry)*



REPUBLIC OF COLOMBIA

MINISTRY OF HEALTH

006882 SPT – 0173 – 93

2 APR 1993

Santafe de Bogota D.C.  
March 17, 1993

Mr. CARLOS HERNAN RICO R.  
Head of Agriculture Supplies Division  
Colombian Agriculture Institute  
Bogota

Dear Sir,

As regards the Health Regulations on Use and Handling of Pesticides under Decree 1843 of 1991 and ICA regulatory Resolutions 992 of 1992 and 10834 of the Ministry of Health,

THE MINISTRY OF HEALTH ISSUES THE  
FOLLOWING PROVISIONAL TOXICOLOGY  
OPINION, LP-0173-93

1. TOXICOLOGY CLASSIFICATION

ROUNDUP HERBICIDE, LIQUID CONCENTRATE WATER SOLUBLE PRODUCED BY MONSANTO COLOMBIANA INC. WITH THE FOLLOWING COMPOSITION:

| <u>ACTIVE INGREDIENT(S)</u> | <u>CONCENTRATION</u> |
|-----------------------------|----------------------|
| Glyphosate                  | 480 g/L              |
| N-phosphonomethylglycine    |                      |

| <u>ADDITIVE INGREDIENT(S)</u> | <u>CONCENTRATION</u> |
|-------------------------------|----------------------|
| Surfactant                    | q.s. 1 Liter         |

THIS BELONGS IN TOXICOLOGY CATEGORY IV, SLIGHTLY TOXIC.

## 2. USE PERMIT

ROUNDUP HERBICIDE, LIQUID CONCENTRATE WATER SOLUBLE produced by MONSANTO COLOMBIANA INC. may be used in the country for AGRICULTURE USE, provided that the established regulations are satisfied and the necessary requirements are adopted to avoid health damages according to CATEGORY IV, SLIGHTLY TOXIC.

3. This opinion supersedes the prior opinion: BP-4018-92

Sincerely,

(Signed and sealed)

CARLOS CALDERÓN LLANTEN  
Deputy Director Risk Factor Control  
Substances

(Signed and sealed)

ALBA LUZ CASTRO MANCERA  
Head Division Potentially Toxic

Cc. MONSANTO COLOMBIANA INC.  
Atn. Eng. RUBEN GERMAN CRUZ K.

REPUBLIC OF COLOMBIA  
MINISTRY OF HEALTH

Bogota D.C.

CRQ-964-2001  
Code 5050

Dr Carlos Augusto Villamizar-Quesada  
Agricultural Materials Division  
Colombian Agriculture Institute - ICA  
Calle 37 No. 8-43 p. 4  
Bogota

Dear Sir or Madam,

The Public Health Division of the Ministry of Health has conducted an evaluation ordered by Decree 1843/1991, Chapter X, and issues the following TOXICOLOGICAL OPINION MP 12118-2001

## 1. USE PERMIT

The herbicide FUETE SOLUBLE LIQUID of CIA AGRICOLA COLOMBIANA LTDA whose composition is:

|                            |               |
|----------------------------|---------------|
| Active ingredients         | Concentration |
| Glyphosate                 | 480 g/L       |
| N- (phosponomethyl)glycine |               |

|                             |                 |
|-----------------------------|-----------------|
| Additive ingredients        | Concentration   |
| Polyoxyethylene amine water | to complete 1 L |

May be used in Colombian territory in application of agricultural use, following the current provisions of law and adopting measures necessary for the protection of health in accordance with the following:

## 2. TOXICOLOGICAL CATEGORY

The herbicide FUETE SOLUBLE LIQUID of CIA AGRICOLA COLOMBIANA LTDA, with the formulation expressed above, correspondence to toxicological category III, Moderately Toxic, and therefore, the appropriate measures for protection should be used, taking account of recommended practices in current regulations.

The holder of this Toxicological Opinion will comply with Law 430/98, Decree 1843/91, and Title F of Resolution 0822/98 of the Ministry of Development, specifically, in the handling of waste and containers of pesticides

Note: THIS TOXICOLOGICAL OPINION SUPERSEDES THE PRIOR OPINIONS MP-5230-94 AND LV-5026-94, DUE TO TOXICOLOGICAL RECLASSIFICATION, AND MODIFICATION OF THE QUANTITATIVE COMPOSITION

Cordially,  
(signed)

Isabel Cristina Ruiz-Buitrago  
Director General, Public Health

Ricardo Leon Vega-Aragon  
Coordinator, Health Protection Group

(signed)

Ana Ruth Ramirez-Guzman  
Professional, Chemical Risks

Copy: CIA AGRICOLA COLOMBIANA LTDA,  
Calle 100 No. 7-33 Bogota

Reference number 1874 and 2081  
Anna Ruth Ramirez- Guzman October 31, 2001



REPUBLIC OF COLOMBIA  
MINISTRY OF HEALTH

5050 Bogota D.C.

CRQ-000285-2002

Mr.

**CARLOS J. ROMERO HERRERA**

Coordinator Chemical Pesticides Registry and Control  
Colombian Agriculture Institute – ICA  
Calle 37 No. 8-43 Piso 4  
Bogota

Dear Sir,

The Health Protection Group of the General Direction of Public Health of the Ministry of Health, after performing the related evaluation ordered by Decree No. 1843 of 1991, Chapter X, issues the following TOXICOLOGY OPINION: LP-12499-2002.

1. USE PERMIT

GLY-41 HERBICIDE, produced by COMPAÑIA AGRICOLA COLOMBIANA LTDA. Y CIA. S.C.A., with the composition:

| ACTIVE INGREDIENT(S)  | CONCENTRATION |
|---|---------------|
| Glyphosate  |               |
| N-phosphonomethylglycine,<br>isopropylamine salt Glyphosate | 480.0 g/L     |

ADDITIVE INGREDIENTS:

| ADDITIVE INGREDIENTS:   | CONCENTRATION |
|---|---------------|
| POLIOXIETILEN, ALKYL PHOSPHATE ESTER,<br>ALKILAMINE, POLYETHYLENE GLYCOL,<br>DIPROPYLENE GLYCOL, BLUE DYE NO. 1,<br>SILICONE BLEND, WATER | q.s. 1 L      |

It may be used in the country for AGRICULTURAL USE applications, compliant with current legal regulations and adopting the necessary measures for health protection according to the following.

2. TOXICOLOGY CATEGORY

HERBICIDE GLY-41, produced by COMPAÑIA AGRICOLA COLOMBIANA LTDA. Y CIA. S.C.A. with the aforementioned formulation belongs to TOXICOLOGY CATEGORY IV, SLIGHTLY TOXIC. It must therefore be used with the corresponding protection measures and following the recommended practices.

The bearer of this Opinion must comply with Law 430/98, Decree 1843/91 and Title F of Resolution 6822/98 of the Ministry of Development, particularly in the management of waste and pesticide containers.

The General Director of Public Health signs this Opinion, which was prepared by Victor M. Varela M.

Sincerely,

(Signed)  
ISABEL CRISTINA RUIZ BUITRAGO  
General Public Health Office

(Signed)  
RICARDO LEON VEGA ARAGON  
Health Protection Coordinator

(Signed)  
VICTOR MANUEL VARELA M.  
University Professional

Cc. FERNANDO SILVA  
CIA. AGRICOLA COLOMBIANA LTDA. Calle 100 No. 7-33, Of 1901 Bogota

File No. 459  
Drafted by: Victor B. Varela B. 17-4-2002

**Annex 36**

**NOTE SPD 338 FROM THE COLOMBIAN AGRICULTURE AND  
LIVESTOCK INSTITUTE TO THE MINISTRY FOR THE ENVIRONMENT  
ENCLOSING WATER SAMPLES ANALYSIS RESULTS FROM CATATUMBO  
REGION, 18 JULY 2002**

*(Archives of the Colombian Foreign Ministry)*



REPUBLIC OF COLOMBIA



*Ministry of Justice and Law  
National Narcotics Directorate*

Bogotá D.C.

18 JULY 2002

SPD - 338

JUAN MAYR MALDONADO  
MINISTER FOR THE ENVIRONMENT

Ref: Analysis of water samples – Catatumbo Region

Dear Mr. Minister:

In response to the Environmental Monitoring activities referred to in the PECIG Environmental Management Plan, attached are the results of laboratory tests on water samples that were collected in the Catatumbo region, under the sample codes No. IR - 29, IR - 30, IR - 31 and IR - 32.

It was determined that in the above results there was no glyphosate present in the samples.

Sincerely,

*[Signed]*

GABRIEL MERCHAN BENAVIDES  
Director

Encl. 5 pages

C:/pma ajustes/Correspondencia Direccion/MMA analisis catatumbo.doc  
SPD/asr

---

Cra. 16 A #79-08 PBX 691-6770 – FAX 691-6690 – email: dneco105@colomsat.net.co Bogotá



When responding, include this number

2.5.10

Mosquera (Cund.)

*Acknowledge receipt*

Ministry of Justice and the Law  
National Narcotics Directorate  
Attn. Dr. ALEXANDRA SHOONEWOLLFF ROMERO  
Deputy Director of Prevention and Development  
Cra 16 A No. 79-08  
Tel: 691-6770  
Bogota

Ref: Analysis Results

For your information and relevant purposes, I am attaching the results of the glyphosate analysis in four water samples that were collected in the Catatumbo region. The samples were encoded in the lab as: IR - 29, IR - 30, IR – 31, and IR - 32.

Best regards,

*[Signed]*

CARLOS A. SALCEDO SALAZAR  
Coordinator, National Laboratory Group. Agricultural Supplies, LANIA  
ICA – Tibaitata

*“AGRICULTURAL PROTECTION  
OUR COMMITMENT TO PEACE”*

CALLE 37 No. 8-43 PISOS 4 Y 5 APARTADO AEREO 7984 FAX 285 4351 - 2882771  
PBX 285 5520 – 258 4800 – 332 3700 e-mail: [documentacion@ica.gov.co](mailto:documentacion@ica.gov.co) BOGOTA D.C. COLOMBIA



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| L.A.N.I.A. | TEST REPORT | AC-RC-20<br>PAGE 1 |
|------------|-------------|--------------------|

|                   |  |            |              |
|-------------------|--|------------|--------------|
| CLIENT            | NATIONAL NARCOTICS<br>DIRECTORATE  | LANIA CODE | IR - 029     |
| DATE OF RECEPTION | 02-JULY-2002   | ISSUE DATE | 04-JULY-2002 |
| NAME              | BAG No. 2 WATER CATATUMBO REGION<br>Type of Material: Water  |            |              |
| SCOPE OF REPORT   | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |            |              |

|        |  |
|--------|--|
| METHOD | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under Standard AR-NE-05 |
|--------|--|

|                  |              |
|------------------|--------------|
| DATE OF ANALYSIS | 04-JULY-2002 |
|------------------|--------------|

|   |   |
|---|---|
| RESULTS   |   |
| GLYPHOSATE:   | Undetected<br>Detection Limit: 7.0 µg/l                             |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural<br>Supplies, LANIA | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |

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| L.A.N.I.A.   | TEST REPORT  |   | AC-RC-20     |
|  |  |   | PAGE 1       |
| CLIENT   | NATIONAL NARCOTICS DIRECTORATE   | LANIA CODE  | IR - 030     |
| DATE OF RECEPTION  | 02-JULY-2002   | ISSUE DATE  | 04-JULY-2002 |
| NAME   | BAG No. 3 WATER CATATUMBO REGION<br>Type of Material: Water  |   |              |
| SCOPE OF REPORT  | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |   |              |
| METHOD   | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under Standard AR-NE-05   |   |              |
| DATE OF ANALYSIS   | 04-JULY-2002   |   |              |
| RESULTS  |  |   |              |
| GLYPHOSATE:  | Undetected<br>Detection Limit: 7.0 µg/l  |   |              |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural Supplies, LANIA |  | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |              |

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| L.A.N.I.A.   | TEST REPORT  | AC-RC-20  |              |
|  |  | PAGE 1  |              |
| CLIENT   | NATIONAL NARCOTICS DIRECTORATE   | LANIA CODE  | IR - 031     |
| DATE OF RECEPTION  | 02-JULY-2002   | ISSUE DATE  | 04-JULY-2002 |
| NAME   | BAG No. 4 WATER CATATUMBO REGION<br>Type of Material: Water  |   |              |
| SCOPE OF REPORT  | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |   |              |
| METHOD   | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under Standard AR-NE-05   |   |              |
| DATE OF ANALYSIS   | 04-JULY-2002   |   |              |
| RESULTS  |  |   |              |
| GLYPHOSATE: Undetected<br>Detection Limit: 7.0 µg/l  |  |   |              |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural Supplies, LANIA |  | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |              |

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| L.A.N.I.A. | TEST REPORT | AC-RC-20 |
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|-------------------|--|------------|--------------|
| CLIENT            | NATIONAL NARCOTICS DIRECTORATE   | LANIA CODE | IR - 032     |
| DATE OF RECEPTION | 02-JULY-2002   | ISSUE DATE | 04-JULY-2002 |
| NAME              | BAG No. 5 WATER CATATUMBO REGION<br>Type of Material: Water  |            |              |
| SCOPE OF REPORT   | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |            |              |

|        |  |
|--------|--|
| METHOD | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under Standard AR-NE-05 |
|--------|--|

|                  |              |
|------------------|--------------|
| DATE OF ANALYSIS | 04-JULY-2002 |
|------------------|--------------|

|  |   |
|--|---|
| RESULTS  |   |
| GLYPHOSATE:  | Undetected<br>Detection Limit: 7.0 µg/l                             |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural Supplies, LANIA | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |

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**Annex 37**

**NOTE N° 00118, FROM THE COLOMBIAN AGRICULTURE AND  
LIVESTOCK INSTITUTE TO THE NATIONAL NARCOTICS  
DIRECTORATE ENCLOSING WATER SAMPLES ANALYSIS RESULTS  
FROM CAQUETÁ REGION, 10 JANUARY 2003**

*(Archives of the Colombian Foreign Ministry)*





When responding, include this number

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Bogotá, 10 JAN 2003

National Narcotics Directorate, When answering note File No.: E-2003-01184, Date: 2003/01/13; Time: 08:43:50; Area: NATIONAL DIRECTOR

Col. ALFONSO PLAZAS VEGA ( Ret'd)  
 Director  
 National Narcotics Directorate  
 Carrera 16 A No. 79-08  
 Bogotá, D.C.

Dear Col Plazas:

I am submitting the results of water samples encoded as IR-052/053 for the analysis of residues of glyphosate and its metabolite AMPA.

Sincerely,

*[Signed]*

ALVARO ABISAMBRA ABISAMBRA  
 General Manager

“AGRICULTURAL PROTECTION, OUR COMMITMENT TO PEACE”



ICA, “2001 National Award  
 for Executive Management”

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*National Police  
Antinarcotics Division*

*Bogotá, 10 JAN 2003  
No. 078 / DIRAN - DIREC*

*RE: Delivery of document*

*To: Doctor  
ALFONSO PLAZAS VEGA  
National Narcotics Director  
Bogotá, D.C.*

*I am enclosing the laboratory results IR052 and IR053 performed on a water sample. It should be noted that the spraying was done with a dose of 10.4 liters per hectare, at a height of 27.9 meters and the aircraft at a flight speed of 140 knots.*

*Sincerely,*

*[Signed]  
Brigadier general JAIME AUGUSTO VERA GARAVITO  
Antinarcotics Director*

*Encl. As announced*

*"I AM PROUD TO BE A POLICE OFFICER"  
antinarcoticos@policia.gov*



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| L.A.N.I.A. | TEST REPORT | AC-RC-20<br>PAGE 1 |
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|                   |  |            |                 |
|-------------------|--|------------|-----------------|
| CLIENT            | NATIONAL NARCOTICS DIRECTORATE<br>ILLICIT CROP ERADICATION AREA  | LANIA CODE | IR - 053        |
| DATE OF RECEPTION | 30-DECEMBER-2002   | ISSUE DATE | 08-JANUARY-2003 |
| NAME              | WATER LENTIC BODY WELL MONTAÑITA LOCATION (CAQUETA);<br>DATE OF COLLECTION: 29-DEC-2002, TIME: 12:40   |            |                 |
| SCOPE OF REPORT   | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |            |                 |

|        |   |
|--------|---|
| METHOD | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under sample standard AR-NE-05 |
|--------|---|

|                  |             |
|------------------|-------------|
| DATE OF ANALYSIS | 08-JAN-2003 |
|------------------|-------------|

|  |         |   |           |
|--|---------|---|-----------|
| <b>RESULTS</b>   |         |   |           |
| Active ingredient  | Results | Recovery %  | DL (µg/L) |
| GLYPHOSATE:  | U       | 34.2  | 7.3       |
| AMPA (aminomethylphosphonic acid)  | U       | 34.9  | 3.6       |
| Yellow sample with the presence of suspended solids.   |         |   |           |
| U: Undetected<br>DL: Detection Limit   |         |   |           |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural Supplies, LANIA |         | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |           |

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*[Translator's note: There is a handwritten text at the top right that says: 3775  
 There is a seal on the chart that says: TOTAL OR PARTIAL TRANSCRIPTION IS PROHIBITED, National Laboratory of Agricultural Supplies, ICA]*



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| L.A.N.I.A. | TEST REPORT | AC-RC-20 |
|            |             | PAGE 1   |

|                   |  |            |                 |
|-------------------|--|------------|-----------------|
| CLIENT            | NATIONAL NARCOTICS DIRECTORATE<br>ILLICIT CROP ERADICATION AREA  | LANIA CODE | IR - 052        |
| DATE OF RECEPTION | 30-DECEMBER-2002   | ISSUE DATE | 08-JANUARY-2003 |
| NAME              | CURRENT OF WATER; DATE OF COLLECTION: 29-DEC-2002, TIME: 12:25; SAMPLE COLLECTION: MUNICIPALITY OF MONTAÑITA (CAQUETA)   |            |                 |
| SCOPE OF REPORT   | It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound. |            |                 |

|        |   |
|--------|---|
| METHOD | Glyphosate: High efficiency liquid chromatography with post column derivatization and fluorescence detector, under sample standard AR-NE-05 |
|--------|---|

|                  |             |
|------------------|-------------|
| DATE OF ANALYSIS | 08-JAN-2003 |
|------------------|-------------|

| RESULTS  |                 |   |           |
|--|-----------------|---|-----------|
| Active ingredient  | Results         | Recovery %  | DL (µg/L) |
| GLYPHOSATE:  | U               | 80.5  | 7.3       |
| AMPA (aminomethylphosphonic acid)  | U               | 62.9  | 3.6       |
| U:   | Undetected      |   |           |
| DL:  | Detection Limit |   |           |
| <i>[Signed (p.p.)]</i><br><b>CARLOS A. SALCEDO SALAZAR</b><br>Coordinator, National Laboratory Group. Agricultural Supplies, LANIA |                 | <i>[Signed]</i><br><b>RENE A. CASTRO JIMENEZ PQ-0824</b><br>Chemist |           |

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*[Translator's note: There is a handwritten text at the top right that says: 3776  
 There is a seal on the chart that says: TOTAL OR PARTIAL TRANSCRIPTION IS PROHIBITED, National Laboratory of Agricultural Supplies, ICA]*



**Annex 38**

**RECORDS OF WATER SAMPLES ANALYSES RESULTS 2005-2007 IN  
THE FRAMEWORK OF THE PROGRAM FOR THE ERADICATION OF  
ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG).**

*(Archives of the Colombian Foreign Ministry)*



## CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING

Date Bogotá D.C. February 15, 2007  
 Company US EMBASSY – NAS OFFICE  
 Ordered by Mr. Gustavo Vargas  
 Fax -  
 Tel 383-2258  
 Address Carrera 45 No. 22D-45 Bogota  
 Analysis requested Analysis of Glyphosate and AMPA in water sample  
 Sample See Chart 1  
 Responsible for Sample Antinarcotics Division  
 Type of Sampling Specific  
 Date of Sampling January 30, 2007  
 Date of Entry February 2, 2007  
 Point of Sampling See Chart 1

No. 1646/07

## I. Identification of Samples

The samples analyzed belong to two water samples taken for the Monitoring Program of the US Embassy of glyphosate herbicide and its aminomethylphosphonic acid metabolite (AMPA) in water. The samples were forwarded by the Antinarcotics Division of the National Police to LAQMA LTDA.

Chart 1 Identification of samples

| LAQMA Code | Field Code                         | Date of Entry |
|------------|------------------------------------|---------------|
| LQ6335     | BAS-300107-LAR-ZANDRE-AGUA-DRENAJE | February 2007 |
| LQ6336     | BAS-300107-LAR-LAGO-AGUA-TIEMPOO   |               |

## 2. MATERIALS AND EQUIPMENT

2.1 a) Reactives. Standard certificate of compound analyzed: Glyphosate N-(phosphonomethylglycine) shows Dr. Ehrenstorfer Lot 40401, 98 ± 0.5% purity; aminomethylphosphonic acid AMPA shows Dr. Ehrenstorfer Lot 21104, 98 ± 0.5% purity, derivatization reagent. P- toluensulfonyl chloride brand SIGMA-ALDRICH, 99.9% purity, lot 13224 EC.

b) Organic solvents for extraction, purification and mobile phase for HPLC reading were all HPLC grade.

2.2 Equipment: Shimadzu Liquid Chromatograph Model LC-6A equipped with two high pressure pumps. Sil 58 autoinjector, UV-160A UV detector variable wavelength: SCL-6B system controller and C-R6A Chromatopac as a signal integrator.

### 3. METHODOLOGY FOR ANALYSIS AND TREATMENT OF THE SAMPLE

Chart 2 presents the methodology for the analysis of glyphosate and AMPA in water samples.

Chart 2. Methodology of Analysis employed, preservatives and hold time.

| Parameter                 | Analysis technique                                  | Reference Method             | Preservation and Max Hold time until Analysis     |
|---------------------------|---|------------------------------|---|
| Glyphosate/AMPA Herbicide | HPLC derivatization with P- toluensulfonyl chloride | J. Chrom. 540 (1991) 411-415 | 14 days until extraction/40 days after extraction |

Identification of Glyphosate and AMPA. In order to identify Glyphosate and AMPA, derivatization with p-toluensulfonyl chloride was conducted, under alkaline conditions. 1 ml extract was in alkaline conditions with phosphate buffer pH 11.2; 0.2 ml of reagent p-toluensulfonyl chloride was added and reaction was at 50° C for 5 minutes in thermostatic bath.

Quantification of glyphosate and AMPA. Quantification was performed by external standard method using calibration curve in the range of 10 to 30 ng/nl of the derivatives of glyphosate paratoluensulfonyl chloride and AMPA - p- toluensulfonyl chloride prepared from certified standard Dr. Ehrenstorfer GMBH.

HPLC Reading conditions. A Nucleoside column Cis 250 mm x 4.6 mm id was used, mobile phase phosphate buffer pH 2.3 - acetonitrile 85:15 v/v. Flow 1.0 ml/min., Injection volume: 10-20 nL. Reading wavelength of 235 nm.

### 4. RESULTS

Table 1 shows the results achieved in the analysis of Glyphosate and AMPA in the water samples analyzed.

Table 1. Analysis Results of Glyphosate and AMPA in two (2) water samples. US Embassy – NAS Office, January 2007

| Identification of Sample |                                    | Units | Results    |       | Detection limit |           |
|--------------------------|------------------------------------|-------|------------|-------|-----------------|-----------|
| LAQMA Code               | Client ID                          |       | Glyphosate | AMPA  | Glyphosate mg/L | AMPA mg/L |
| LQ6335                   | BAS-300107-LAR-ZANDRE-AGUA-DRENAJE | mg/L  | < 0.010    | 20.53 | 0.010           | 0.008     |
| LQ6336                   | BAS-300107-LAR-LAGO-AGUA-TIEMPOO   | mg/L  | < 0.010    | 0.008 | 0.010           | 0.008     |

#### UNITS

mg/L Milligrams of the compound of interest per liter of sample analyzed or ppm (parts per million)

U Non detectable to limit of detection of method employed

#### NOTE:

Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 5. COMMENTS TO RESULTS

No Glyphosate of AMPA found in the samples analyzed.

The samples were delivered to the lab by the client and were analyzed just as they were received.

Sincerely,

[signed]  
 MARTHA CARPINTERO  
 Chemist M.Sc. Environmental  
 PQ-0569  
 Technical Office

[signed]  
 OMAR TRUJILLO  
 T.Q. - Chemical Analyst  
 T.Q. 053

#### RESULTS OF THE ANALYSIS – CHEMICAL LABORATORY OF ENVIRONMENTAL MONITORING

Report No. 1646/07 CRA 30 No. 90-33 Tel. 236-6178, Fax 621-9213



**CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING  
RESULTS OF THE ANALYSIS**

|                        |   |
|------------------------|---|
| Date                   | Bogotá D.C. November 10, 2006                     |
| Company                | US EMBASSY – NAS OFFICE                           |
| Ordered by             | Mr. Gustavo Vargas                                |
| Fax                    | -   |
| Tel                    | 383-2258  |
| Address                | Carrera 45 No. 22D-45 Bogota                      |
| Analysis requested     | Analysis of Glyphosate and AMPA in a water sample |
| Sample                 | See Chart 1                                       |
| Responsible for Sample | Antinarcotics Division                            |
| Type of Sampling       | Specific  |
| Date of Sampling       | See Chart 1                                       |
| Date of Entry          | October 27, 2006                                  |
| Point of Sampling      | Chart 1   |

No. 1513/06

#### I. Identification of Samples

The sample analyzed belong to one water sample taken for the Monitoring Program of the US Embassy of glyphosate herbicide and its aminomethylphosphonic acid metabolite (AMPA) in water. The samples were forwarded by IGAC to LAQMA LTDA. Table 1 identifies the sample analyzed.

Chart 1 Identification of samples

| LAQMA Code | Field Code                   | Date of Entry    |
|------------|------------------------------|------------------|
| LQ-6012    | VER-14-091006-1D167-AGUA-LOT | October 27, 2006 |

#### 2. MATERIALS AND EQUIPMENT

2.1 a) Reactives. Standard certificate of compound analyzed: Glyphosate N-(phosphonomethylglycine) shows Dr. Ehrenstorfer Lot 40401, 98 ± 0.5% purity; aminomethylphosphonic acid AMPA shows Dr. Ehrenstorfer Lot 21104, 98 ± 0.5% purity, derivatization reagent. P- toluensulfonyl chloride brand SIGMA-ALDRICH, 99.9% purity, lot 13224 EC.

b) Organic solvents for extraction, purification and mobile phase for HPLC reading were all HPLC grade.

2.2 Equipment: Shimadzu Liquid Chromatograph Model LC-6A equipped with two high-pressure pumps. Sil 58 autoinjector, UV-160A UV detector variable wavelength: SCL-6B system controller and C-R6A Chromatopac as a signal integrator.

### 3. METHODOLOGY FOR ANALYSIS AND TREATMENT OF THE SAMPLE

Chart 2 presents the methodology for the analysis of glyphosate and AMPA in water samples.

Chart 2. Methodology of Analysis employed, preservatives and hold time.

| Parameter                 | Analysis technique                                  | Reference Method             | Preservation and Max Hold time until Analysis     |
|---------------------------|---|------------------------------|---|
| Glyphosate/AMPA Herbicide | HPLC derivatization with P- toluensulfonyl chloride | J. Chrom. 540 (1991) 411-415 | 14 days until extraction/40 days after extraction |

Identification of Glyphosate and AMPA. In order to identify Glyphosate and AMPA, derivatization with p-toluensulfonil chloride was conducted, under alkaline conditions. 1 ml extract was in alkaline conditions with phosphate buffer pH 11.2; 0.2 ml of reagent p-toluensulfonil chloride was added and reaction was at 50° C for 5 minutes in thermostatic bath.

Quantification of glyphosate and AMPA. Quantification was performed by external standard method using calibration curve in the range of 10 to 30 ng/ml of the derivatives of glyphosate paratoluensulfonyl chloride and AMPA - p- toluensulfonyl chloride prepared from certified standard Dr. Ehrenstorfer GMBH.

HPLC Reading conditions. A Nucleoside column Cis 250 mm x 4.6 mm id was used, mobile phase phosphate buffer pH 2.3 - acetonitrile 85:15 v/v. Flow 1.0 ml/min., Injection volume: 10-20 nL. Reading wavelength of 235 nm.

### 4. RESULTS

Table 1 shows the results achieved in the analysis of Glyphosate and AMPA in the water samples analyzed.

Table 1. Analysis Results of Glyphosate and AMPA in one (1) water sample. US Embassy – NAS Office, October 2006

| Identification of Sample |                              | Units | Results    |      | Detection limit |           |
|--------------------------|------------------------------|-------|------------|------|-----------------|-----------|
| LAQMA Code               | Client ID                    |       | Glyphosate | AMPA | Glyphosate mg/L | AMPA mg/L |
| LQ-6012                  | VER-14-091006-1D167-AGUA-LOT | mg/L  | U          | U    | 0.010           | 0.008     |

#### UNITS

mg/L Milligrams of the compound of interest per liter of sample analyzed or ppm (parts per million)

U Non detectable to limit of detection of method employed

#### NOTE:

Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 5. COMMENTS TO RESULTS

No Glyphosate or AMPA found in the samples analyzed.

The samples were delivered to the lab by the client and were analyzed just as they were received

Sincerely,

|   |  |
|---|--|
| [signed]<br>MARTHA CARPINTERO<br>Chemist M.Sc. Environmental<br>PQ-0569<br>Technical Office | [signed]<br>OMAR TRUJILLO<br>T.Q. - Chemical Analyst<br>T.Q. 053 |
|---|--|

#### RESULTS OF THE ANALYSIS – CHEMICAL LABORATORY OF ENVIRONMENTAL MONITORING

Report No. 1513/06 CRA 30 No. 90-33 Tel. 236-6178, Fax 621-9213, Page 3 of 3





**CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING  
RESULTS OF THE ANALYSIS**

|                        |  |
|------------------------|--|
| Date                   | Bogotá D.C. August 22, 2006                      |
| Company                | US EMBASSY – NAS OFFICE                          |
| Ordered by             | Mr. Gustavo Vargas                               |
| Fax                    | -  |
| Tel                    | 383-2258   |
| Address                | Carrera 45 No. 22D-45 Bogota                     |
| Analysis requested     | Analysis of Glyphosate and AMPA in water samples |
| Sample                 | Water (See Chart 1)                              |
| Responsible for Sample | Unidentified                                     |
| Type of Sampling       | Unidentified                                     |
| Date of Sampling       | Unidentified                                     |
| Date of Entry          | August 3, 2006                                   |
| Point of Sampling      | See Chart 1                                      |

No. 1445/06

**I. Identification of Samples**

The samples analyzed belong to six (6) water samples taken for the Monitoring Program of the US Embassy of glyphosate herbicide and its aminomethylphosphonic acid metabolite (AMPA) in water. The samples were forwarded by IGAC to LAQMA LTDA. Table 1 identifies the sample analyzed.

Chart 1 Identification of samples

| LAQMA Code | Field Code                                  | Date of Entry  |
|------------|---|----------------|
| L-5878     | Monitoreo/2006/NorteSantander/60dias/Lotel  | August 3, 2006 |
| L-5879     | Monitoreo/2006/NorteSantander/60dias/Lote 2 |                |
| L-5880     | MONDECAL220606ID02ANTESAGUALOT              |                |
| L-5881     | MONDECAL220606ID02DESP-00AGUALOT            |                |
| L-5882     | MONDECAL220606ID01DESP-00AGUALOT            |                |
| L-5883     | MONDECAL220606ID01ANTESAGUALOT              |                |

**2. MATERIALS AND EQUIPMENT**

2.1 a) Reactives. Standard certificate of compound analyzed: Glyphosate N-(phosphonomethylglycine) shows Dr. Ehrenstorfer Lot 40401,  $98 \pm 0.5\%$  purity; aminomethylphosphonic acid AMPA shows Dr. Ehrenstorfer Lot 21104,  $98 \pm 0.5\%$  purity,

derivatization reagent. P- toluensulfonyl chloride brand SIGMA-ALDRICH, 99.9% purity, lot 13224 EC.

b) Organic solvents for extraction, purification and mobile phase for HPLC reading were all HPLC grade.

2.2 Equipment: Shimadzu Liquid Chromatograph Model LC-6A equipped with two high-pressure pumps. Sil 58 autoinjector, UV-160A UV detector variable wavelength: SCL-6B system controller and C-R6A Chromatopac as a signal integrator.

### 3. METHODOLOGY FOR ANALYSIS AND TREATMENT OF THE SAMPLE

Chart 2 presents the methodology for the analysis of Glyphosate and AMPA in water samples.

Chart 2. Methodology of Analysis employed, preservatives and hold time.

| Parameter                 | Analysis technique                                  | Reference Method             | Preservation and Max Hold time until Analysis     |
|---------------------------|---|------------------------------|---|
| Glyphosate/AMPA Herbicide | HPLC derivatization with P- toluensulfonyl chloride | J. Chrom. 540 (1991) 411-415 | 14 days until extraction/40 days after extraction |

Identification of Glyphosate and AMPA. In order to identify Glyphosate and AMPA, derivatization with p-toluensulfonil chloride was conducted, under alkaline conditions. 1 ml extract was in alkaline conditions with phosphate buffer pH 11.2; 0.2 ml of reagent p-toluensulfonil chloride was added and reaction was at 50° C for 5 minutes in thermostatic bath.

Quantification of glyphosate and AMPA. Quantification was performed by external standard method using calibration curve in the range of 10 to 30 ng/nl of the derivatives of glyphosate paratoluensulfonyl chloride and AMPA - p- toluensulfonyl chloride prepared from certified standard Dr. Ehrenstorfer GMBH.

HPLC Reading conditions. A Nucleoside column Cis 250 mm x 4.6 mm id was used, mobile phase phosphate buffer pH 2.3 - acetonitrile 85:15 v/v. Flow 1.0 ml/min., Injection volume: 10-20 nL. Reading wavelength of 235 nm.

### 4. RESULTS

Table 1 shows the results achieved in the analysis of Glyphosate and AMPA in the water samples analyzed.

Table 1. Analysis Results of Glyphosate and AMPA in six (6) water samples. US Embassy – NAS Office, August 2006

| Identification of Sample |   | Units | Results    |      | Detection limit |           |
|--------------------------|---|-------|------------|------|-----------------|-----------|
| LAQMA Code               | Client ID                                   |       | Glyphosate | AMPA | Glyphosate mg/L | AMPA mg/L |
| L-5878                   | Monitoreo/2006/NorteSantander/60dias/Lote 1 | mg/L  | <DL        | <DL  | 0.010           | 0.008     |
| L-5879                   | Momitoreo/2006/NorteSantander/60dias/Lote 2 | mg/L  | <DL        | <DL  |                 |           |
| L-5880                   | MONDECAL220606ID02ANTESAGUALOT              | mg/L  | <DL        | <DL  |                 |           |
| L-5881                   | MONDECAL220606ID02DESP-00AGUALOT            | mg/L  | <DL        | <DL  |                 |           |
| L-5882                   | MONDECAL220606ID01DESP-00AGUALOT            | mg/L  | <DL        | <DL  |                 |           |
| L-5883                   | MONDECAL220606ID01ANTESAGUALOT              | mg/L  | <DL        | <DL  |                 |           |

#### UNITS

mg/L Milligrams of the compound of interest per liter of sample analyzed or ppm (parts per million)

#### NOTE:

Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 5. COMMENTS TO RESULTS

No Glyphosate or AMPA found in the samples analyzed.

The samples were delivered to the lab by the client and were analyzed just as they were received.

Sincerely,

(signed)  
 MARTHA CARPINTERO  
 Chemist M.Sc. Environmental  
 PQ-0569  
 Technical Office

(signed)  
 OMAR TRUJILLO  
 T.Q. - Chemical Analyst  
 T.Q. 053

RESULTS OF THE ANALYSIS – CHEMICAL LABORATORY OF ENVIRONMENTAL MONITORING

Report No. 1445/06 CRA 30 No. 90-33 Tel. 236-6178, Fax 621-9213, Page 3 of 3

CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING  
RESULTS OF THE ANALYSIS

Date Bogotá D.C. September 11, 2006

Company US EMBASSY – NAS OFFICE

Ordered by Mr. Gustavo Vargas

Fax -

Tel 383-2258

Address Carrera 45 No. 22D-45 Bogota

Analysis requested Analysis of Glyphosate and AMPA in water samples

Sample Water (See Chart 1)

Responsible for Sample Antinarcotics División

Type of Sampling Specific

Date of Sampling August 25, 2006

Date of Entry August 28, 2006

Point of Sampling See Chart 1

No. 1467/06

## I. Identification of Samples

The samples analyzed belong to two (2) water samples taken for the Monitoring Program of the US Embassy of glyphosate herbicide and its aminomethylphosphonic acid metabolite (AMPA) in water. The samples were forwarded by IGAC to LAQMA LTDA. Table 1 identifies the sample analyzed.

Chart 1 Identification of samples

| LAQMA Code | Field Code                             | Date of Entry   |
|------------|--|-----------------|
| L-5932     | MON-DECAL-250806-ID01-DESP-60-AGUA-LOT | August 28, 2006 |
| L-5933     | MON-DECAL-250806-ID02-DESP-60-AGUA-LOT |                 |

## 2. MATERIALS AND EQUIPMENT

2.1 a) Reactives. Standard certificate of compound analyzed: Glyphosate N-(phosphonomethylglycine) shows Dr. Ehrenstorfer Lot 40401, 98 ± 0.5% purity; aminomethylphosphonic acid AMPA shows Dr. Ehrenstorfer Lot 21104, 98 ± 0.5% purity, derivatization reagent. P- toluensulfonyl chloride brand SIGMA-ALDRICH, 99.9% purity, lot 13224 EC.

b) Organic solvents for extraction, purification and mobile phase for HPLC reading were all HPLC grade.

2.2 Equipment: Shimadzu Liquid Chromatograph Model LC-6A equipped with two high-pressure pumps. Sil 58 autoinjector, UV-160A UV detector variable wavelength: SCL-6B system controller and C-R6A Chromatopac as a signal integrator.

### 3. METHODOLOGY FOR ANALYSIS AND TREATMENT OF THE SAMPLE

Chart 2 presents the methodology for the analysis of Glyphosate and AMPA in water samples.

Chart 2. Methodology of Analysis employed, preservatives and hold time.

| Parameter                 | Analysis technique                                  | Reference Method             | Preservation and Max Hold time until Analysis     |
|---------------------------|---|------------------------------|---|
| Glyphosate/AMPA Herbicide | HPLC derivatization with P- toluensulfonyl chloride | J. Chrom. 540 (1991) 411-415 | 14 days until extraction/40 days after extraction |

Identification of Glyphosate and AMPA. In order to identify Glyphosate and AMPA, derivatization with p-toluensulfonil chloride was conducted, under alkaline conditions. 1 ml extract was in alkaline conditions with phosphate buffer pH 11.2; 0.2 ml of reagent p-toluensulfonil chloride was added and reaction was at 50° C for 5 minutes in thermostatic bath.

Quantification of glyphosate and AMPA. Quantification was performed by external standard method using calibration curve in the range of 10 to 30 ng/<sup>1</sup> of the derivatives of glyphosate paratoluensulfonyl chloride and AMPA - p- toluensulfonyl chloride prepared from certified standard Dr. Ehrenstorfer GMBH.

HPLC Reading conditions. A Nucleoside column Cis 250 mm x 4.6 mm id was used, mobile phase phosphate buffer pH 2.3 - acetonitrile 85:15 v/v. Flow 1.0 ml/min., Injection volume: 10-20  $\mu$ L. Reading wavelength of 235 nm.

### 4. RESULTS

Table 1 shows the results achieved in the analysis of Glyphosate and AMPA in the water samples analyzed.

Table 1. Analysis Results of Glyphosate and AMPA in two (2) water samples. US Embassy - NAS Office, August 2006

| Identification of Sample |  | Units | Results    |      | Detection limit |           |
|--------------------------|--|-------|------------|------|-----------------|-----------|
| LAQMA Code               | Client ID                              |       | Glyphosate | AMPA | Glyphosate mg/L | AMPA mg/L |
| L-5932                   | MON-DECAL-250806-ID01-DESP-60-AGUA-LOT | mg/L  | <DL        | <DL  | 0.010           | 0.008     |
| L-5933                   | MON-DECAL-250806-ID02-DESP-60-AGUA-LOT | mg/L  | <DL        | <DL  |                 |           |

#### UNITS

mg/L                    Milligrams of the compound of interest per liter of sample analyzed or ppm  
(parts per million)

#### NOTE:

Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 5. COMMENTS TO RESULTS

No Glyphosate of AMPA found in the samples analyzed.

The samples were delivered to the lab by the client and were analyzed just as they were received

Sincerely,

|               |          |
|---------------|----------|
| (signed)      | (signed) |
| MARTHA        | OMAR     |
| CARPINTERO    | TRUJILLO |
| Chemist M.Sc. | T.Q. -   |
| Environmental | Chemical |
| PQ-           | Analyst  |
| 0569Technical | T.Q. 053 |
| Office        |          |

#### RESULTS OF THE ANALYSIS – CHEMICAL LABORATORY OF ENVIRONMENTAL MONITORING

Report No. 1467/06 CRA 30 No. 90-33 Tel. 236-6178, Fax 621-9213, Page 3 of 3



When responding, include this number.

L.A.N.I.A. TEST REPORT AC-RC-20 PAGE 1/1

CLIENT ACUATECNICA LTDA LANÍA CODE ER 078  
 DATE OF RECEPTION: OCTOBER 18, 2005 ISSUE DATE: DECEMBER 22, 2005

NAME LARANDIA LAKE WATER, SAMPLE 1 SURFACE RAW WATER,  
 SURFACE SAMPLING OF LARANDIA LAKE ÁREA OF INFLUENCE.  
 TYPE OF MATERIAL WATER

SCOPE OF REPORT It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound.

METHOD HPLC Liquid chromatography with derivatization post column and fluorescence direction under internal regulation AR-NE-05.

DATE OF ANALYSIS December 22, 2005

#### RESULTS

|             | Results (mg/L) | DL (ng/L) | %Recovery |
|-------------|----------------|-----------|-----------|
| GLYPHOSATE: | 0.01           |           |           |
| AMPA        | U              | 4         |           |

DL: Detection Limit  
 U: Undetected

(signed)  
 RENE A. CASTRO JIMENEZ  
 Coordinator LANIA Group

(signed)  
 HUGO A. RODRIGUEZ FAJARDO PQ-1495  
 Chemist

*Agricultural Protection- Our Commitment to Peace*  
 C.I. Tibaitata Km 14 via a Mosquera, Laboratorio Nacional de Insumos Agrícolas - LANÍA  
 Pbx. 422-7371/21, direct line 422-7363/64, Fax 422-7363



When responding, include this number.

L.A.N.I.A. TEST REPORT AC-RC-20 PAGE 1/1

CLIENT ACUATECNICA LTDA LANIA CODE ER 081  
 DATE OF RECEPTION: OCTOBER 18, 2005 ISSUE DATE: DECEMBER 22, 2005

NAME LARANDIA LAKE WATER, SAMPLE 1 DEEP RAW WATER, DEEP WATER SAMPLING OF LARANDIA LAKE AREA OF INFLUENCE. TYPE OF MATERIAL WATER

SCOPE OF REPORT It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound.

METHOD HPLC Liquid chromatography with derivatization post column and fluorescence direction under internal regulation AR-NE-05.

DATE OF ANALYSIS December 22, 2005

#### RESULTS

|             | Results (mg/L) | DL (µg/L) | %Recovery |
|-------------|----------------|-----------|-----------|
| GLYPHOSATE: | 0.01           |           |           |
| AMPA        | U              | 4         |           |

DL: Detection Limit  
 U: Undetected

(signed) RENE A.  
 CASTRO JIMENEZ  
 Coordinator LANIA Group

(signed) HUGO A. RODRIGUEZ  
 FAJARDO PQ-1495 Chemist

*Agricultural Protection- Our Commitment to Peace* C.I. Tibaitata Km 14 via a Mosquera, Laboratorio Nacional de Insumos Agrícolas Pbx. 422-7371/21, direct line 422-7363/64, Fax 422-7363 LANIA





When responding, include this number.

L.A.N.I.A. TEST REPORT AC-RC-20 PAGE 1/1

CLIENT NATIONAL NARCOTICS DIVISION LANIA CODE ER 105

DATE OF RECEPTION: DECEMBER 6, 2005 ISSUE DATE: DECEMBER 30, 2005

NAME ANTINARCOTICS DIVISION WATER SAMPLE, ERADICATION AREA,  
SAMPLING CODE MDENAR-05 WATER 1D01AG.  
INTERADMINISTRATIVE AGREEMENT FOR SERVICE 045 OF 2004.  
TYPE OF MATERIAL: WATER

SCOPE OF REPORT It is our pleasure to present the findings of the analysis requested by you. These results are only applicable to the samples delivered and it does not pertain to the Official Control to which ICA is bound.

METHOD Glyphosate: HPLC Liquid chromatography with derivatization post column and direction by fluorescence by direct injection.

DATE OF ANALYSIS December 30, 2005

#### RESULTS

|             | Results (mg/L) | DL (µg/L) | %Recoveiy |
|-------------|----------------|-----------|-----------|
| GLYPHOSATE: | U              | 7         |           |
| AMPA        | U              | 4         |           |

DL: Detection Limit

U: Undetected

(signed) RUTE ANALIDA  
BETANCOURT CASTRO Coordinator  
LANIA Group

(signed) HUGO A.  
RODRIGUEZ FAJARDO PQ-1495  
Professional, Responsible for Residuals Area

*Agricultural Protection- Our Commitment to Peace* C.I. Tibaitata Km 14 via a Mosquera, Laboratorio Nacional de Insumos Agrícolas Pbx. 422-7371/21, direct line 422-7363/64, Fax 422-7363



## **Annex 39**

### **RECORDS OF SOIL SAMPLES ANALYSES RESULTS 2005-2008 IN THE FRAMEWORK OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG).**

*(Archives of the Colombian Foreign Ministry)*





Kappa Laboratories, Inc.

[www.kappalabs.com](http://www.kappalabs.com)

2577 N.W. 74th Avenue • Miami, Florida 33122  
Phone (305) 599-0199 • Fax (305) 592-1224

Mt. Sinai Medical Center • Biomedical Research  
Pearlman Building 4300 Alton Road • Miami  
Beach, Florida 33140

## LABORATORY REPORT

### CLIENT:

Instituto Geografico  
Carrera 30 No 48-51  
Bogota Colombia

REPORT DATE: 5/2/2005

SOURCE: Soil- Meta Guaviare Nucleus  
SAMPLE DATE: 1/19/2005  
SAMPLE RECEIVED: 1200 03/15/2005  
SAMPLED BY: Client

JOB#: 340560-3  
SAMPLE LOG#: F468  
SAMPLE I.D. ID 150 Nariño Province

| PARAMETER                  | RESULT     | UNITS  | METHODS | DETECTION LIMIT | DATE EXT. | DATE ANALY. | ANALYST |
|----------------------------|------------|--------|---------|-----------------|-----------|-------------|---------|
| Glyphosate                 | U          | /-g/kg | 547     | 250             | 04/20/05  | 04/20/05    | IF      |
| AMPA                       | U          | /-g/kg | 547     | 200             | 04/20/05  | 04/20/05    | IF      |
| Spike Recovery- Glyphosate | 57 Percent |        |         |                 |           |             |         |
| Spike Recovery- AMPA       | 72 Percent |        |         |                 |           |             |         |

U: Undetected

Kappa Laboratories has been inspected and is currently certified by the U.S. Department of Agriculture (USDA Microbiology# 0093)

The Florida Dept of Health, Drinking Water, Including Microbiology, Pesticides and PCB's Environmental certification as Basic Environmental Laboratory (DOH # E86515) (FDEP CompQAP [...] Registered with the U.S. Food and Drug Administration (FDA # 1039389) and is an FDA Accepted Laboratories for Impact Testing. Kappa Laboratory is currently a

Contract Laboratory to the U.S. Centers for Disease Control (CDC) Atlanta Georgia, Vessel Sanitation Program.

Test results meet all Requirements of NELAC requirements.

Signed: (signed)

Denise Kmieck

Manager, Kappa Laboratories, Inc.



Kappa Laboratories, Inc.

[www.kappalabs.com](http://www.kappalabs.com)

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Phone (305) 599-0199 • Fax (305) 592-1224

Mt. Sinai Medical Center • Biomedical Research  
Pearlman Building 4300 Alton Road • Miami  
Beach, Florida 33140

## LABORATORY REPORT

CLIENT:

Instituto Geografico  
Carrera 30 No 48-51  
Bogota Colombia

REPORT DATE: 5/2/2005

SOURCE: Soil-  
SAMPLE DATE: 1/19/2005  
SAMPLE RECEIVED: 1200 03/15/2005  
SAMPLED BY: Client

JOB #: 340560-3  
SAMPLE LOG #: F469  
SAMPLE I.D. ID 143 Nariño Province

| PARAMETER                  | RESULT     | UNITS  | METHODS | DETECTION LIMIT | DATE EXT. | DATE ANALY. | ANALYST |
|----------------------------|------------|--------|---------|-----------------|-----------|-------------|---------|
| Glyphosate                 | U          | /-g/kg | 547     | 250             | 04/20/05  | 04/20/05    | IF      |
| AMPA                       | U          | /-g/kg | 547     | 200             | 04/20/05  | 04/20/05    | IF      |
| Spike Recovery- Glyphosate | 57 Percent |        |         |                 |           |             |         |
| Spike Recovery- AMPA       | 72 Percent |        |         |                 |           |             |         |

U: Undetected

Kappa Laboratories has been inspected and is currently certified by the U.S. Department of Agriculture (USDA Microbiology# 0093)

The Florida Dept of Health, Drinking Water, Including Microbiology, Pesticides and PCB's Environmental certification as Basic Environmental Laboratory (DOH # E86515) (FDEP CompQAP [...]) Registered with the U.S. Food and Drug Administration (FDA # 1039389) and is an FDA Accepted Laboratories for Impact Testing. Kappa Laboratory is currently a

Contract Laboratory to the U.S. Centers for Disease Control (CDC) Atlanta Georgia, Vessel Sanitation Program.

Test results meet all Requirements of NELAC requirements.

Signed: (signed)  
Denise Kmieck  
Manager, Kappa Laboratories, Inc.



Kappa Laboratories, Inc.

[www.kappalabs.com](http://www.kappalabs.com)

2577 N.W. 74th Avenue • Miami, Florida 33122  
Phone (305) 599-0199 • Fax (305) 592-1224

Mt. Sinai Medical Center • Biomedical Research  
Pearlman Building 4300 Alton Road • Miami  
Beach, Florida 33140

## LABORATORY REPORT

### CLIENT:

Instituto Geografico  
Carrera 30 No 48-51  
Bogota Colombia

REPORT DATE: 5/2/2005

SOURCE: Soil-  
SAMPLE DATE: 1/19/2005  
SAMPLE RECEIVED: 1200 03/15/2005  
SAMPLED BY: Client

JOB #: 340560-3  
SAMPLE LOG #: F470  
SAMPLE I.D. ID 140 Nariño Province

| PARAMETER                  | RESULT     | UNITS  | METHODS | DETECTION LIMIT | DATE EXT. | DATE ANALY. | ANALYST |
|----------------------------|------------|--------|---------|-----------------|-----------|-------------|---------|
| Glyphosate                 | U          | /-g/kg | 547     | 250             | 04/20/05  | 04/20/05    | IF      |
| AMPA                       | U          | /-g/kg | 547     | 200             | 04/20/05  | 04/20/05    | IF      |
| Spike Recovery- Glyphosate | 57 Percent |        |         |                 |           |             |         |
| Spike Recovery- AMPA       | 72 Percent |        |         |                 |           |             |         |

U: Undetected

Kappa Laboratories has been inspected and is currently certified by the U.S. Department of Agriculture (USDA Microbiology# 0093)

The Florida Dept of Health, Drinking Water, Including Microbiology, Pesticides and PCB's Environmental certification as Basic Environmental Laboratory (DOH # E86515) (FDEP CompQAP [...]) Registered with the U.S. Food and Drug Administration (FDA # 1039389) and is an FDA Accepted Laboratories for Impact Testing. Kappa Laboratory is currently a Contract Laboratory to the U.S. Centers for Disease Control (CDC) Atlanta Georgia, Vessel Sanitation Program.

Test results meet all Requirements of NELAC requirements.

Signed: (signed)  
Denise Kmieck  
Manager, Kappa Laboratories, Inc.

## SOIL LABORATORY

## RESULTS OF CHEMICAL ANALYSIS OF SOIL

Date: Day 22, Month 08, Year 2005

Province: Nariño

Municipality:

Location:

Sender: Environmental Monitoring Program

PECIG

Laboratory No. 3-59652 A 655

| Field ID                      | Granulometry |           |           | Texture class | Gravel % | pH                    |           | Al   | SAI  | Salinity |       | P total ppin | Organic material |         |
|-------------------------------|--------------|-----------|-----------|---------------|----------|-----------------------|-----------|------|------|----------|-------|--------------|------------------|---------|
|                               | Sand %       | Lime %    | Clay %    |               |          | 1.1                   | 1.2       |      |      | [...]    | [...] |              | OC [...]         | N total |
| V12-05 SUELO ID - 84-AC -SUBÍ | 39.9         | 24.9      | 35.2      | FA *          |          | 4.3                   |           | 2.1  | 50.9 |          |       | 241          | 2.7              | 0.13    |
| V12-05 SUELO ID - 84-AC -SUB2 | 42.8         | 25.4      | 31.8      | FA *          |          | 4.7                   |           | 0.71 | 10.4 |          |       | 161          | 4.1              | 0.18    |
| V12-05 SUELO ID - 83-AC -SUBÍ | 70.2         | 21.3      | 8.5       | FA *          |          | 5.3                   |           | 0.75 | 15.9 |          |       | 1057         | 4.2              | 0.25    |
| V12-05 SUELO ID - 83-AC -SUB2 | 68.9         | 22.8      | 8.3       | FA *          |          | 4.5                   |           | 1.9  | 78.2 |          |       | 1025         | 5.0              | 0.31    |
| Exchange complex (meq /100 g) |              |           |           |               | SB       | Trace elements (ppin) |           |      |      |          | ppin  |              |                  |         |
| [...]                         | Calcium      | Magnesium | Potassium | Sodium        |          | [...]                 | Magnesium | Iron | Zinc | Copper   | Boron | [...]        | [...]            | Sulfur  |
| 17.8                          | 1.2          | 0.38      | 0.27      | 0.11          | 2.0      | 11.3                  |           |      |      |          | 33.5  | 20.7         |                  | 2.2     |
| 27.1                          | 4.8          | 0.95      | 0.33      | 0.06          | 6.1      | 22.7                  |           |      |      |          | 49.9  | 29.6         |                  | 1.4     |
| 33.8                          | 2.1          | 0.63      | 1.1       | 0.16          | 4.0      | 11.8                  |           |      |      |          | 30.4  | 26.2         |                  | 15.4    |
| 33.7                          | 0.07         | 0.10      | 0.22      | 0.13          | 0.52     | 1.5                   |           |      |      |          | 32.3  | 8.0          |                  | 9.8     |

\* THE SAMPLE DID NOT SCATTER PROPERLY: THE % OF CLAY MAY BE GREATER

METHODS: [...] texture, exchangeable acidity (EA) with KCl, electrical conductivity of the saturation extract. Organic carbon (OC), [...] available phosphorus (P) [...] carbon exchange capacity and exchange basis (calcium, magnesium, potassium and sodium. [...] normal and neutral. Trace elements magnesium (Mg), iron (Fe) zinc (Zn) and copper (Cu) extraction with [...] Boron (B) [...]

[...]

[...]

[...]

[...]

Please communicate your suggestion, opinion or claim to telephone no.369-4016 or 369-4000 ext 4016

Sincerely,  
(Signed)  
Chemical Área Coordinator



## SOIL LABORATORY

## RESULTS OF CHEMICAL ANALYSIS OF SOIL

Date: Day 22, Month 08, Year 2005

Province: Nariño

Municipality:

Location:

Sender: Environmental Monitoring Program

PECIG

Laboratory No. 3-59652 A 655

| Field ID                      | Granulometry |            |            | Texture class | Gravel % | pH   |            | Al                    | SAI  | Salinity |        | P total ppin | Organic material |         |             |
|-------------------------------|--------------|------------|------------|---------------|----------|------|------------|-----------------------|------|----------|--------|--------------|------------------|---------|-------------|
|                               | Sand %       | Lime %     | Cia y %    |               |          | 1.1  | 1.2        |                       |      | [...]    | [...]  |              | OC [...]         | N total |             |
| V12-05 SUELO ID - 84-AC -SUBI | 39.9         | 24.9       | 35.2       | FA *          |          | 4.3  |            | 2.1                   | 50.9 |          |        | 241          | 2.7              | 0.13    |             |
| V12-05 SUELO ID - 84-AC -SUB2 | 42.8         | 25.4       | 31.8       | FA *          |          | 4.7  |            | 0.71                  | 10.4 |          |        | 161          | 4.1              | 0.18    |             |
| V12-05 SUELO ID - 83-AC -SUBI | 70.2         | 21.3       | 8.5        | FA *          |          | 5.3  |            | 0.75                  | 15.9 |          |        | 1057         | 4.2              | 0.25    |             |
| V12-05 SUELO ID - 83-AC -SUB2 | 68.9         | 22.8       | 8.3        | FA *          |          | 4.5  |            | 1.9                   | 73.2 |          |        | 1026         | 5.0              | 0.31    |             |
| Exchange complex (meq /100 g) |              |            |            |               |          | SB   |            | Trace elements (ppin) |      |          |        |              | ppin             |         |             |
| [...]                         | Calci um     | Magn esium | Potas sium | Sod ium       | [...]    |      | Mag nesium | Iron                  | Zinc | Cop per  | Boro n | [...]        | [...]            | Sulfú r | Phos phorus |
| 17.8                          | 1.2          | 0.38       | 0.27       | 0.11          | 2.0      | 11.3 |            |                       |      |          |        | 33.5         | 20.7             |         | 2.2         |
| 27.1                          | 4.8          | 0.95       | 0.33       | 0.06          | 6.1      | 22.7 |            |                       |      |          |        | 49.9         | 29.6             |         | 1.4         |
| 33.8                          | 2.1          | 0.63       | 1.1        | 0.16          | 4.0      | 11.8 |            |                       |      |          |        | 30.4         | 26.2             |         | 15.4        |
| 33.7                          | 0.07         | 0.10       | 0.22       | 0.13          | 0.52     | 1.5  |            |                       |      |          |        | 32.3         | 8.0              |         | 9.8         |

\* THE SAMPLE DID NOT SCATTER PROPERLY: THE % OF CLAY MAY BE GREATER

METHODS: [...] texture, exchangeable acidity (EA) with KCl, electrical conductivity of the saturation extract. Organic carbon (OC), [...] available phosphorus (P) [...] carbon exchange capacity and exchange basis (calcium, magnesium, potassium and sodium. [...] normal and neutral. Trace elements magnesium (Mg), iron (Fe) zinc (Zn) and copper (Cu) extraction with [...] Boron (B) [...]

[...]

[...]

[...]

[...]

Please communicate your suggestion, opinion or claim to telephone no.369-4016 or 369-4000 ext 4016

Sincerely,  
(Signed)  
Chemical Área Coordinator



Ministerio del Interior y de Justicia  
República de Colombia



## CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING RESULTS OF THE ANALYSIS

|                        |  |
|------------------------|--|
| Date                   | Bogotá D.C. April 2008   |
| Company                | UNION TEMPORAL AUDITORIA PECIG   |
| Ordered by             | Eng. Natalia Cadena Villarraga   |
| Address                | Calle 73 No. 10-10 Of 506 Bogota D.C.  |
| Fax/Tel                | [...] 1570   |
| E-mail                 | [...]  |
| Analysis requested     | Identification of Glyphosate AMPA and physical chemical characterization in soil |
| Sample                 | LQ7 186, LQ7 187   |
| Sampling               | Specific   |
| Responsible for Sample | Jenny Mendoza  |
| Date of Sampling       | February 8, 2008   |
| Date of Entry          | March 17, 2008   |

No. 1971/08

### 1. Identification of Samples

| LAQMA Code                                 | Field Code | Coordinates                    | Date of Entry  |
|--|------------|--------------------------------|----------------|
| LQ7 186 MON-DENAR-080208-IDO1-ANTES-SUELO  |            | 01°50'22 2' N<br>78°29'59 9' W | March 17, 2008 |
| LQ7 187 MON-DENAR-080208-IDO1-DESP-O-SUELO |            | 01°50'22 2' N<br>78°29'59 9' W |                |

### 2. Methodology of Analysis and Treatment of the Sample

Chart 1 shows the methodology employed for the analysis of the samples.

Chart 1 Methodology of Analysis employed, preservatives and hold time

| Parameter                    | Reference Method                 | Preservation and Max Hold time until Analysis        |
|------------------------------|----------------------------------|--|
| Glyphosate/AMPA<br>Herbicide | J AQAC int 1989, 72 No. 2<br>355 | 14 days until extraction/40<br>days after extraction |

Chart 1 – Continued Methodology of Analysis employed, preservatives and hold time

| Parameter                                | IGAC Reference Method                       | Preservation and Max Hold time until Analysis |
|--|---|---|
| Texture                                  | Bouyoucos                                   | NA  |
| Organic carbón                           | Walkley-Black                               | NA  |
| pH                                       | Saturation paste                            | NA  |
| Exchange capacity – ratio exchange bases | Total Cations                               | NA  |
| Assimilable phosphorus                   | Bray II colorimetry                         | NA  |
| Ammonia nitrogen                         | Extraction with sodium chloride. Clorimetry | NA  |
| Nitric nitrogen (nitrates, nitritos)     | Extraction with sodium acetate              | NA  |

### 3. RESULTS

Table 1 shows the results achieved in the analysis of the samples.

Table 1. Analysis Results of Soil, UNION TEMPORAL PECIG LTDA., March 2008

| Parameter                              | Units  | Results                           |                                    | Detection Limit |
|--|--------|-----------------------------------|------------------------------------|-----------------|
|  |        | LQ7 186                           | LQ7 187                            |                 |
|  |        | MON-DENAR-080208-IDO1-ANTES-SUELO | MON-DENAR-080208-IDOI-DESP-O-SUELO | DL              |
| Glyphosate                             | mg/kg  | U                                 | 1.56                               | 0.8             |
| Ampa                                   | mg/kg  | U                                 | U                                  | 0.4             |
| pH                                     | Units  | 4.14                              | 4.41                               |                 |
| Exchange capacity CEC – exchange bases | me/100 | 8.33                              | 5.35                               |                 |
| Nitrates + nitritos                    | mg/L   | 35                                | 21                                 |                 |
| Ammonia nitrogen                       | mg/L   | 31                                | 27                                 |                 |
| Organic matter                         | %      | 4.80                              | 3.10                               |                 |
| Texture - Fine-Sandy                   |        |                                   |                                    |                 |
| Sand                                   | %      | 64                                | 66                                 |                 |
| Lime                                   | %      | 16                                | 14                                 |                 |
| Clay                                   | %      | 20                                | 13                                 |                 |

#### UNITS

mg/kg Milligrams of the compound of interest per kilogram of sample analyzed or ppm (parts per million)

U Undetectable to limit of detection of method employed

<MLD Less than minimum level of detection

NOTE: Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 4. COMMENTS TO RESULTS

The samples were delivered to the lab by the client and were analyzed just as they were received.

Sincerely,

(signed)  
MARTHA CARPINTERO  
Chemist M.Sc. Environmental  
PQ-0569

(signed)  
OMAR TRUJILLO  
T.Q. - Chemical Analyst  
T.Q. 053

RESULTS OF THE ANALYSIS [...]

Report No. 1971/08 [...]

Calle 53 No. 13 -27 Bogotá D.C. Colombia PBX: 4870088  
[www.dne.gov.co](http://www.dne.gov.co)



**CHEMICAL LABORATORY FOR ENVIRONMENTAL MONITORING  
RESULTS OF THE ANALYSIS**

|                        |   |
|------------------------|---|
| Date                   | Bogotá D.C. April 7, 2008                       |
| Company                | US EMBASSY – NAS OFFICE                         |
| Ordered by             | Mr. Gustavo Vargas                              |
| Fax                    | -   |
| Tel                    | 383-2258  |
| Address                | Carrera 45 No. 22D-45 Bogota                    |
| Analysis requested     | Analysis of Glyphosate and AMPA in soil samples |
| Sample                 | Soils (see Table 1)                             |
| Responsible for Sample | Antinarcotics Division                          |
| Type of Sampling       | Specific  |
| Date of Sampling       | February 8, 2008                                |
| Date of Entry          | March 12, 2008                                  |
| Point of Sampling      | See Table 1                                     |

No. 1972/08

### I. Identification of Samples

The samples analyzed belong to two soil samples taken by the Monitoring Program of the US Embassy of glyphosate herbicide and its aminomethylphosphonic acid metabolite (AMPA) in soils. Table 1 identifies the samples analyzed.

Table 1 Identification of samples

| LAQMA Code | Field Code                         | Coordinates | Date of Entry |
|------------|------------------------------------|-------------|---------------|
| LQ7 186    | MON-DENAR-080208-IDO1-ANTES-SUELO  |             | March 12,     |
| LQ7 187    | MON-DENAR-080208-IDO1-DESP-O-SUELO |             | 2008          |

### 2. MATERIALS AND EQUIPMENT

2.1 a) Reactives. Standard certificate of compound analyzed: Glyphosate N-(phosphonomethylglycine) shows Dr. Ehrenstorfer Lot 40401, 98 ± 0.5% purity; aminomethylphosphonic acid AMPA shows Dr. Ehrenstorfer Lot 21104, 98 ± 0.5% purity, derivatization reagent. P- toluenesulfonyl chloride brand SIGMA-ALDRICH, 99.9% purity, lot 13224 EC.

b) Organic solvents for extraction, purification and mobile phase for HPLC reading were all HPLC grade.

2.2 Equipment: Shimadzu Liquid Chromatograph Model LC-6A equipped with two high pressure pumps. Sil 58 autoinjector, UV-160A UV detector variable wavelength: SCL-6B system controller and C-R6A Chromatopac as a signal integrator.

### 3. METHODOLOGY FOR ANALYSIS AND TREATMENT OF THE SAMPLE

Table 2 presents the methodology for the analysis of glyphosate and AMPA in soil samples.

Table 2. Methodology of Analysis employed, preservatives and hold time.

| Parameter                 | Analysis technique      | Reference Method              | Preservation and Max Hold time until Analysis     |
|---------------------------|-------------------------|-------------------------------|---|
| Glyphosate/AMPA Herbicide | Solid-liquid extraction | J AQAC int 1989, 72 No. 2 355 | 14 days until extraction/40 days after extraction |

Preliminary pretreatment of samples. Prior to analysis, soil samples were homogenized, sieved through sieve No. 5 (4.0 mm) ASTM series and took the moisture content below 10% at room temperature to avoid losses of the compounds of interest.

Extraction of glyphosate and AMPA in soil. The extraction treatment applied corresponds to soil samples with high clay content and organic matter according to the classification of texture samples sent by the IGAC. 25 grams of the samples were weighed, which were subjected to extraction with 0.2 M KOH for 15 minutes; the sample was centrifuged at 1500 rpm and filtered through filter paper, glass fiber; the residue was resubmitted to the extraction, centrifugation and filtration process. The extract obtained was concentrated to 5 ml and passed through anion exchange column OH-form, the analyte of interest was eluted with 0.5 M HCl; the extract obtained was dry and redissolved in 2 ml of mobile phase used in reading by HPLC.

Later, in order to perform the identification of compounds of interest, Glyphosate and AMPA, derivatization of the extract obtained was conducted.

Derivatization. Glyphosate and AMPA Standards as well as the sample extracts were subjected to the process of derivatization with p-toluenesulfonyl chloride under alkaline conditions. 1 ml extract was in alkaline conditions with phosphate buffer pH 11.2; 0.2 ml of reagent p-toluenesulfonyl chloride was added and reaction was at 50° C for 5 minutes in thermostatic bath.

Quantification of glyphosate and AMPA. Quantification was performed by external standard method using calibration curve in the range of 10 to 30 ng/μl of the derivatives

of glyphosate paratoluensulfonyl chloride and AMPA - p- toluensulfonyl chloride prepared from certified standard Dr. Ehrenstorfer GMBH.

HPLC Reading conditions. A Nucleoside column C18 250 mm x 4.6 mm id was used, mobile phase phosphate buffer pH 2.3 - acetonitrile 85:15 v/v. Flow 1.0 ml/min., Injection volume: 10 µL. Reading wavelength of 235 nm.

#### 4. RESULTS

Table 1 shows the results achieved in the analysis of Glyphosate and AMPA in the soil samples analyzed.

Table 1. Analysis Results of Glyphosate and AMPA in two (2) soil samples. US Embassy – NAS Office, March 2008

| Identification of Sample |  | Units | Results    |      | Detection limit  |            |
|--------------------------|--|-------|------------|------|------------------|------------|
| LAQMA Code               | Client ID                              |       | Glyphosate | AMPA | Glyphosate mg/kg | AMPA mg/kg |
| LQ7 188                  | MON-DENAR-080208-<br>IDOI-AN TES-SUELO | mg/kg | U          | U    | 0.8              | 0.4        |
| LQ7 189                  | MON-DENAR-080208-<br>IDOI-DESP-O-SUELO | mg/kg | 6.97       | U    |                  |            |

#### UNITS

mg/kg Milligrams of the compound of interest per kilogram of sample analyzed or ppm (parts per million)

U Non detectable to limit of detection of method employed

<MLD Less than minimum level of detection

#### NOTE:

Report is valid for the described analysis; not to be reproduced without lab authorization.

#### 5. COMMENTS TO RESULTS

The samples were delivered to the lab by the client and were analyzed just as they were received.

Sincerely,

(signed)  
MARTHA CARPINTERO  
Chemist M.Sc. Environmental  
PQ-0569

(signed)  
OMAR TRUJILLO  
T.Q. – Chemical Analyst  
T.Q. 053

#### RESULTS OF THE ANALYSIS – CHEMICAL LABORATORY OF ENVIRONMENTAL MONITORING

Report No. 1972/08 CRA 30 No. 90-33 Tel. 236-6178, Fax 621-9213





## **Annex 40**

**NOTE 2400-2.139140 FROM THE MINISTRY FOR THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, TO THE MINISTRY OF FOREIGN AFFAIRS OF COLOMBIA, ENCLOSING THE LIST OF ORDERS ISSUED BY THE MINISTRY FOR THE ENVIRONMENT REGARDING CONTROL AND FOLLOW UP OF THE ENVIRONMENTAL MANAGEMENT PLAN OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG), 3 NOVEMBER 2011**

*(Archives of the Colombian Foreign Ministry)*



National Authority on Environmental Licenses  
Republic of Colombia

2400-2. 139140

Bogotá, D.C, 03 Nov. 2011

Ms.  
SONIA PEREIRA PORTILLA  
Ambassador  
Coordinator Internal Work Group  
Affairs before the International Court of Justice  
Carrera 5 No. 9-03 Edificio Marco Fidel Suarez

REFERENCE: Request for information on the follow-up by the Ministry for the Environment and Sustainable Development on the Program for the Eradication of Illicit Crops.

Dear Ms. Pereira:

Pursuant to the request made by your Coordinating Office on 20 Oct 2011, I am submitting in an enclosed document, the different administrative decisions - orders-issued by the Ministry for the Environment, Housing and Territorial Development, now the Ministry for the Environment and Sustainable Development, as part of the control and follow-up on the environmental management plan of the program for the eradication of illicit crops by aerial spraying with glyphosate herbicide – PECIG, pursuant provisions in article 5 of resolution 1054 of 2003.

To date, there are some Orders pending to be issued, corresponding to follow-up made in September and October this year.

Sincerely,

[Signed]  
**LUZ HELENA SARMIENTO VILLAMIZAR**  
General Director

Enclosure: As announced in two (2) pages  
File: 0793  
Prepared by: José Agustín Zea, Contractor  
Revised by: Camilo Rincón, Legal Advisor

National Authority on Environmental Licenses  
Republic of Colombia

ORDERS ISSUED BY THE MINISTRY FOR THE ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT, NOW THE MINISTRY FOR THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, AS PART OF THE CONTROL AND FOLLOW-UP ON THE ENVIRONMENTAL MANAGEMENT PLAN OF THE PROGRAMME FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE HERBICIDE – PECIG, PURSUANT PROVISIONS IN ARTICLE 5 OF RESOLUTION 1054 OF 2003.

| ADMINISTRATIVE RULING | DATE                  |
|-----------------------|-----------------------|
| Order 707             | Of 26 July 2004.      |
| Order 113             | Of 03 February 2005.  |
| Order 734             | Of 10 May 2005.       |
| Order 1542            | Of 30 August 2005.    |
| Order 1543            | Of 30 August 2005.    |
| Order 2282            | Of 21 December 2005.  |
| Order 2283            | Of 21 December 2005.  |
| Order 086             | Of 23 January 2006.   |
| Order 106             | Of 23 January 2006.   |
| Order 1172            | Of 14 June 2006.      |
| Order 1174            | Of 14 June 2006.      |
| Order 1175            | Of 14 June 2006.      |
| Order 1283            | Of 10 July 2006.      |
| Order 1606            | Of 23 August 2006.    |
| Order 1609            | Of 23 August 2006.    |
| Order 1627            | Of 25 August 2006.    |
| Order 1632            | Of 25 August 2006.    |
| Order 1653            | Of 29 August 2006.    |
| Order 1912            | Of 18 September 2006. |
| Order 1967            | Of 25 September 2006. |
| Order 2900            | Of 15 December 2006.  |
| Order 2901            | Of 15 December 2006.  |
| Order 2965            | Of 22 December 2006.  |
| Order 2970            | Of 22 December 2006.  |
| Order 0798            | Of 29 March 2007.     |
| Order 0897            | Of 12 April 2007.     |
| Order 0917            | Of 13 April 2007.     |
| Order 0918            | Of 13 April 2007.     |
| Order 0919            | Of 13 April 2007.     |
| Order 1152            | Of 07 May 2007.       |
| Order 1607            | Of 26 June 2007.      |
| Order 1609            | Of 26 June 2007.      |
| Order 1827            | Of 16 July 2007.      |
| Order 2018            | Of 31 July 2007.      |
| Order 2019            | Of 31 July 2007.      |
| Order 2242            | Of 22 August 2007.    |

National Authority on Environmental Licenses  
Republic of Colombia

|            |                       |
|------------|-----------------------|
| Order 2409 | Of 05 September 2007. |
| Order 2907 | Of 25 October 2007.   |
| Order 2940 | Of 30 October 2007.   |
| Order 3021 | Of 08 November 2007.  |
| Order 3236 | Of 04 December 2007.  |
| Order 3237 | Of 04 December 2007.  |
| Order 3454 | Of 27 December 2007.  |
| Order 0558 | Of 25 February 2008.  |
| Order 0991 | Of 31 March 2008.     |
| Order 1490 | Of 07 May 2008.       |
| Order 1564 | Of 15 May 2008.       |
| Order 1847 | Of 11 June 2008.      |
| Order 2091 | Of 03 July 2008.      |
| Order 2288 | Of 25 July 2008.      |
| Order 2313 | Of 29 July 2008.      |
| Order 2547 | Of 15 August 2008.    |
| Order 2781 | Of 05 September 2008. |
| Order 2933 | Of 22 September 2008. |
| Order 3309 | Of 13 November 2008.  |
| Order 3313 | Of 13 November 2008.  |
| Order 3491 | Of 02 December 2008.  |
| Order 3492 | Of 02 December 2008.  |
| Order 3496 | Of 02 December 2008.  |
| Order 0097 | Of 23 January 2009.   |
| Order 170  | Of 30 January 2009.   |
| Order 171  | Of 30 January 2009.   |
| Order 0389 | Of 23 February 2009.  |
| Order 0435 | Of 25 February 2009.  |
| Order 0542 | Of 05 March 2009.     |
| Order 0827 | Of 25 March 2009.     |
| Order 1240 | Of 30 April 2009.     |
| Order 1337 | Of 11 May 2009.       |
| Order 1520 | Of 22 May 2009.       |
| Order 1797 | Of 16 June 2009.      |
| Order 1798 | Of 16 June 2009.      |
| Order 1913 | Of 25 June 2009.      |
| Order 2126 | Of 17 July 2009.      |
| Order 2130 | Of 17 July 2009.      |
| Order 2342 | Of 06 August 2009.    |
| Order 2518 | Of 28 August 2009.    |
| Order 2545 | Of 31 August 2009.    |
| Order 2582 | Of 03 September 2009. |
| Order 2731 | Of 25 September 2009. |
| Order 2876 | Of 09 October 2009.   |
| Order 3470 | Of 23 December 2009.  |
| Order 3471 | Of 23 December 2009.  |
| Order 3473 | Of 23 December 2009.  |

**National Authority on Environmental Licenses**  
 Republic of Colombia

|            |                       |
|------------|-----------------------|
| Order 0100 | Of 20 January 2010.   |
| Order 0209 | Of 29 January 2010.   |
| Order 0239 | Of 04 February 2010.  |
| Order 0415 | Of 19 February 2010.  |
| Order 0999 | Of 06 April 2010.     |
| Order 1556 | Of 11 May 2010.       |
| Order 2152 | Of 11 June 2010.      |
| Order 2634 | Of 12 July 2010.      |
| Order 3485 | Of 16 September 2010. |
| Order 3734 | Of 08 September 2010. |
| Order 3790 | Of 15 October 2010.   |
| Order 3862 | Of 26 October 2010.   |
| Order 3863 | Of 26 October 2010.   |
| Order 3864 | Of 26 October 2010.   |
| Order 3974 | Of 05 November 2010.  |
| Order 4573 | Of 30 December 2010.  |
| Order 0333 | Of 07 February 2011.  |
| Order 0336 | Of 07 February 2011.  |
| Order 0339 | Of 07 February 2011.  |
| Order 1121 | Of 18 April 2011.     |
| Order 1132 | Of 18 April 2011.     |
| Order 1220 | Of 02 May 2011.       |
| Order 1614 | Of 31 May 2011.       |
| Order 1746 | Of 09 June 2011.      |
| Order 2354 | Of 22 July 2011.      |
| Order 2864 | Of 30 August 2011.    |
| Order 2873 | Of 30 August 2011.    |

**Annex 40-A**

**MINISTRY FOR THE ENVIRONMENT, *ORDER No. 2282* WHEREBY A MONITORING OF THE EXECUTION OF THE ENVIRONMENTAL MANAGEMENT PLAN OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG) IS CARRIED OUT, 21 DECEMBER 2005.**

*(Archives of the Colombian Foreign Ministry)*







Ministry for the Environment, Housing and Territorial Development  
Licenses, Permits and Environmental Procedures Division  
Republic of Colombia

[21 DEC 2005]

Bogota, D.C.

**ORDER No. [2282]**  
“Performing a monitoring”

**THE ADVISOR OF THE DEPUTY MINISTER FOR THE ENVIRONMENT  
LICENSES, PERMITS AND ENVIRONMENTAL PROCEDURES DIVISION**

In exercise of the powers under Resolution No. 1084 of August 9, 2005 amending the Work and Minimum Requirements Handbook of the Ministry for the Environment, Housing and Territorial Development, and

**WHEREAS**

**BACKGROUND**

This Ministry, by Resolution No. 1065 of November 26, 2001, enforced the Environmental Management Plan for the activity called “Program for the Eradication of Illicit Crops by aerial spraying with glyphosate - PECIG” in the national territory.

The designated Environmental Management Plan as modified by this Ministry by Resolution No. 1054 of September 30, 2003, to adjust the Sheets that comprise it and to incorporate in its execution, in addition to the National Narcotics Directorate, other government entities such as Agustin Codazzi Geographical Institute - IGAC, National Institute of Health, the Anti-Narcotics Police and the Ministry of Interior and Justice.

By communication No. 2457 of September 12, 2005, the Coordinator of Grievance of the Illicit Crop Eradication Area of the Anti-Narcotics Police, DIRAN, informed the Director of the Sustainable Development Sector about conducting a field visit for verification of complaints in some municipalities of the provinces of Caquetá and Putumayo, and requested the appointment of an official of this Ministry to form the technical team for conducting the verification.

By communication No. 1610 of the ARECI-JEFAT of October 5, 2005, the Coordinator of Grievance of the Illicit Crop Eradication Area of the Anti-Narcotics Police, DIRAN, informed the Director of the Sustainable Development Sector of this Ministry about conducting a field visit for verification of complaints in some municipalities of the province of Norte de Santander, and requested the appointment of an official of this Ministry to form the technical team for conducting the verification.

[Page 1]

The Director of the Sustainable Development Sector together with the Department of Licenses, Permits and Environmental Procedures of the Ministry, in exercise of the functions assigned to control and monitoring assigned thereof, developed Technical

Opinions No. 1753 of October 5, 2005 and No. 1823 of October 26, 2005, which stated the following:

**CONSIDERATIONS ON TECHNICAL OPINION No. 1753 of 2005**

“This Technical Opinion is grounded on information obtained from the technical visits to different areas where aerial spraying will take place (Environmental Monitoring) and areas where spraying coca crops with glyphosate was performed (verification of complaints).

“Dates of verification and Environmental Monitoring: September 20-23, 2005

“Geographical Area for Environmental Monitoring and Verification: provinces of Caquetá and Putumayo.

“Members of the Verification and Monitoring Commission:

|                               |  |
|-------------------------------|--|
| – David Rodriguez, engineer   | Agustin Codazzi Geographical Institute (IGAC)                    |
| – Jairo Pérez Ruiz, engineer  | National Narcotics Division (DNE)                                |
| – Luis Boada, engineer        | Colombian Agriculture Institute (ICA)                            |
| – Captain James Roa           | Coordinator, Complaints Group, Anti Narcotics Police (DIRAN)     |
| – Captain Miguel Tunjano      | Coordinator, Verification Group, Anti Narcotics Police (DIRAN)   |
| – Lt Col (Ret) Carlos Narvaez | Officer, NAS Office, US Embassy                                  |
| – José Agustín Zea, engineer  | Ministry of the Environment, Housing and Territorial Development |

“Materials and equipment:

- Two (2) helicopters and aircraft for transport between cities
- Satellite geopositioners
- Mapping of the areas to verify
- Laptops
- Digital cameras
- Elements for collecting water and soil samples

“Activities performed:

[Page 2]

“Verification of Complaints

“Verification of selected points was conducted by helicopter over flights around the coordinate defined, by assessing the following aspects:

- Effects on the environment, identifying the effect on other coverages, drift and the existence of housing or water bodies within the sprayed area.
- Additional observations, identifying the evidence or not of reseeded or pruning activities, field conditions and those other situations that may be considered of interest for verification

For this purpose, the Area of Illicit Crop Eradication screened the 52 complaints sites located in the municipalities of Albania, Solita, Belén de los Andaquies, Cartagena del Chaira, located in the province of Caquetá and in the municipalities of Villa Garzón, Puerto Asís and Orito, located in the province of Putumayo.

“In summary, the number of plots subject to verification and the visit dates were as follows:

| Municipalities  | Number of points | Verification date 2005 |
|---|------------------|------------------------|
| Belén de los Andaquies, Albania, Solita, Cartagena del Chaira | 27               | September 21 and 22    |
| Villa Garzón, Puerto Asís and Orito                           | 19               | September 22           |
| Total plots   | 46               |                        |

“Of the total georeferenced points (52), the points listed below could not be visited due to climatic conditions:

| Municipality         | Number of points | Verification date 2005 |
|----------------------|------------------|------------------------|
| Cartagena del Chaira | 06               | Not verified           |
| Total plots          | 06               |                        |

“The arrival to each of the sites was done in helicopter, proceeding to locate the exact coordinates of the area to verify, with the use of the satellite ...

[Page 3]

...geopositioners. Once the site has been located, the helicopter pilot made double 360-degree spins in both directions and at low altitude in order to have a better appreciation of the lots to verify.

“Attached are Minutes 16 and 17 of 2005 signed by those present in this verification, the routes and plans of the field visit of the complaints arising from the Program for the Eradication of Illicit Crops with Glyphosate.

“Environmental Monitoring

“Environmental monitoring activities to be performed on the nucleus of illicit crops in Putumayo - Caquetá, correspond to the sampling of water and soil for the phases before and immediately after spraying, according to the research protocol established in the Plan Environmental Management PECIG.

“For this purpose, helicopter transport was performed from the military base in Villa Garzón to an area near the border with Ecuador, where the PECIG is scheduled to begin spraying to eradicate coca crops. We performed a total of three descents in sites that will later be sprayed and the geographical coordinates of which are presented in the table below, by taking samples of water, soil and plant material, according to protocol established by the ICA.

“These samples were properly packaged, labeled, refrigerated and then sent to Bogota for the respective analysis.

| Plot | Date   | Sample |       | North     | West       |
|------|--------|--------|-------|-----------|------------|
|      |        | Soil   | Water |           |            |
| 1    | Before | x      | x     | 0° 16.04' | 76° 46.24' |
| 2    | Before | x      | x     | 0° 16.11' | 76° 47.56' |
| 3    | Before | x      | x     | 0° 18.38' | 76° 53.38' |

Sampling of the second phase (post-spraying) was not possible due to adverse weather conditions which prevented conducting this activity which must be reprogrammed again by the Anti-Narcotics Police.

That taking into account the above the above opinion concluded that:

As a result of field observations conducted in the sites selected for verification, the following considerations are made:

[Page 4]

#### 1. Observations during the verification of complaints

The majority of the sprayed coca crops are located in areas suitable for forestry, which have been continuously being taken over by the removal of natural vegetation, making them suitable for installation of pastures and crops, including coca. Illicit crops are located in areas of flat to undulating relief, characterized by poor soils, regularly drained and subject to erosion and denuded processes.

Some of the plots sprayed were subject to replanting practices, observing the practice of intercropping of banana, fruit and yucca plants in coca cultivation. Side effects from spraying are caused by the effect of drift of the spray; in that sense there was no evidence the loss of foliage in arboreal and bush species was not evidenced, in areas adjacent to sprayed plots. No adverse effect to lawful economic activities was observed, other than that which was inside the coca plots.

The monitoring allows showing the continuity of slash and burn practices for the adapting of areas for agricultural activities or eventually, the planting of coca crops. Likewise, during the course, coca seedlings and primary infrastructure for the processing of coca leaf were observed.

In sprayed and abandoned sites, the natural regeneration processes are evident and they are present in varying degrees, depending on the weather and soil conditions.

Practices of intercropping and fractioning of illicit with licit crops continues to occur in most of the sites evaluated. The intercropping of coca is generally made with plantain, corn, yucca and fruit trees.

## 2. Environmental Monitoring Activity

Environmental Monitoring activities in water and soil in the Putumayo - Caquetá nucleus, before spraying, was conducted in three (3) different plots and was performed to determine the behavior of residues of glyphosate and its metabolite AMPA, and its possible relationship to physicochemical and biological properties thereof, taking several samples in one same plot, in accordance with protocols approved by the Agustín Codazzi Geographical Institute - IGAC and the Colombian Agricultural Institute - ICA, for sampling of soil and water.

The purpose of these analyses is to understand the dynamics of glyphosate and its metabolite AMPA and their effect on physicochemical and biological properties of water and soil and to assess the impact of the application, by comparing residues in sampled plots before spraying, immediately thereafter, 60, 90 and 180 days after spraying, if warranted.

[Page 5]

1. With respect to the verification visit to the sites that were the subject of complaints by spraying with glyphosate, the implementation of new coca crops were widely observed, in some cases intercropped with subsistence crops and seedlings ready for planting new coca areas; there were no side effects on forest vegetation near the sprayed plots; also noted were that the lots that had been abandoned show natural regeneration processes, with herbaceous vegetation and shrubs.

In general and according to what was verified in all areas that contain illicit crops, the most important impact to the environment is being caused by the effect of indiscriminate logging and burning to which extensive areas of forest cover are being subjected, and putting at risk the stability of the ecosystems and the environmental functions derived therefrom. There, agricultural activities are established, both licit and illicit, as are activities like livestock, which further increase and enhance the deterioration of the natural environment.

Considering that Resolution No. 017 of 2001 of the National Narcotics Board has delegated to the Anti-Narcotics Police, DIRAN, and to the National Narcotics Division, DNE, the responsibility to conduct the processing of complaints arising from the PECIG operation, these will be the entities that will issue the corresponding Opinion on the findings of the field visit. In this regard, the Ministry verifies the performance of the activity by the entities listed, as part of compliance with the measures set out in Sheet No. 6 of the Environmental Management Plan.

2. As for the Environmental Monitoring, the first phase of this activity was held, according to the protocol, pending the stages after spraying of plots, since due to bad weather it was not possible to perform this activity, therefore being postponed and will be held as soon as the Anti-Narcotics Police, DIRAN, schedules it.

The Environmental Monitoring Results for the Putumayo - Caquetá nucleus and concerning the dynamics of glyphosate and its metabolite AMPA and their effect on the physicochemical and biological characteristics of water and soil by comparing residues in sampled plots before spraying, immediately thereafter, sixty (60), ninety (90) and one hundred eighty (180) days after spraying, if warranted, will be delivered by the National Narcotics Directorate in the semiannual report.

In keeping with the purpose of the visit and the considerations submitted, this opinion does not make additional or specific requirements to the other agencies responsible for implementing the Environmental Management Plan.

3. The following documentation is part of this Technical Opinion:

Minutes No. 025/05, relating to the Environmental Monitoring (sampling of water and soil) before the spraying operation, the Putumayo - Caquetá nucleus.

Minutes No. 16/05 with regard to the visit field for complaints from the program for the eradication of illicit crops with glyphosate (PECIG) in the municipalities of Orito, Puerto Asis and Villa Garzón, province of Putumayo.

Minutes No. 17/05 regarding the field visits by complaints from the program for the Eradication of illicit crops with Glyphosate (PECIG) in the municipalities of Solita, Belén de los Andaquíes, Albania and Cartagena del Chairá, Caqueta province.

Table of routes in the field visit in the province of Putumayo, along with the respective map of location of verification points.

Charts and maps of the three (3) routes of field visit conducted in the Province of Caquetá of the complaints of the verification activity.

Similarly, attached are some photographs on three (3) pages, taken during the field visit conducted by this Ministry, which include both complaints verification activities and environmental monitoring.

#### **TECHNICAL OPINION CONSIDERATIONS No. 1823 of 2005**

“The Technical Opinion was prepared based on information obtained from the technical visits to different areas where spraying was performed on coca crops with glyphosate (verification of complaints.)

“Dates of Verification of Complaints: 08 to 10 October 2005

“Geographic Area of Complaints Verification: Norte de Santander province

“Members of the Verification Committee:

|                              |  |
|------------------------------|--|
| – Jairo Pérez Ruiz, engineer | Environmental Audit, National Narcotics Division (DNE)           |
| – Luis Boada, engineer       | Colombian Agriculture Institute (ICA)                            |
| – Captain James Roa          | Coordinator, Complaints Group, Anti Narcotics Police (DIRAN)     |
| – Lt Luis Villarreal         | Official, Complaints Group, Anti Narcotics Police (DIRAN)        |
| – José Agustín Zea, engineer | Ministry of the Environment, Housing and Territorial Development |

“Materials and equipment:

- Two (2) helicopters and aircraft for transport between cities
- Satellite geopositioners
- Mapping of the areas to verify
- Laptops
- Digital cameras

“Activities performed:

“Verification of Complaints

“Verification of selected points was conducted by helicopter over flights around the coordinate defined, assessing the following aspects:

- Effects on the environment, identifying the effect on other coverages, drift and the existence of housing or water bodies within the sprayed area.
- Additional observations, identifying the evidence or not of reseeded or pruning activities, field conditions and those other situations that may be considered of interest for verification

“For this purpose, the Area of Illicit Crop Eradication screened the 28 complaints sites located in the municipalities of Cucuta, Sardinata and El Zulia, located in the province of Norte de Santander.

“In summary, the number of plots subject to verification and the visit dates were as follows:

| Municipalities                 | Number of points | Verification date 2005 |
|--------------------------------|------------------|------------------------|
| Cucuta, Sardinata and El Zulia | 26               | October 09 and 10      |
| Total plots                    | 26               |                        |

“Of the total georeferenced points (28), the points listed below were where “Dumping” occurred by the fumigation aircraft that was shot down by subversive organizations:

| Municipality | Number of points | Verification date 2005 |
|--------------|------------------|------------------------|
| El Tarra     | 02               | October 09             |
| Total plots  | 02               |                        |

“The arrival to each of the sites was done in helicopter, proceeding to locate the exact coordinates of the area to verify, with the use of the satellite geopositioners. Once the site has been located, the helicopter pilot made double 360-degree spins in both directions and at low altitude in order to have a better appreciation of the lots to verify.

“Attached to this Opinion are the routes and coordinates of the field visit of the complaints stemming from the Program for the Eradication of illicit crops with glyphosate.”

The aforementioned technical opinion considered the following:

“As a result of the observations in the field advanced to the sites selected for verification, the following considerations are made:

“Observations made in the Verification of Complaints

“The majority of the sprayed coca crops are located in areas suitable for forestry, which have been continuously being taken over by the removal of natural vegetation, making them suitable for installation of pastures and crops, including coca. Illicit crops are located in areas of flat to undulating relief, characterized by poor soils, regularly drained and subject to erosion and denuded processes.

Some of the plots sprayed were subject to replanting practices, observing the practice of intercropping of banana, fruit and yucca plants in coca cultivation. Side effects from spraying are caused by the effect of drift of the spray; in that sense there was no evidence the loss of foliage in tree and shrub species in areas adjacent to the sprayed plots. In the areas evaluated there was no indication of impact on licit economy, different from that found in the coca plots.

“The monitoring allows showing the continuity of slash and burn practices for the adapting of areas for agricultural activities or eventually, the planting of coca crops. Likewise, during the course, coca seedlings and primary infrastructure for the processing of coca leaf were observed.

“In sprayed and abandoned sites, the natural regeneration processes are evident and they are present in varying degrees, depending on the weather and soil conditions.

“Practices of intercropping and fractioning of illicit with licit crops continues to occur in most of the sites evaluated. The intercropping of coca is generally made with plantain, corn, yucca fruit trees and pastures.

The Technical Opinion finishes with the following considerations:

“With respect to the verification visit to the sites that were the subject of complaints by spraying with glyphosate, the implementation of new coca crops were widely observed, in some cases intercropped with subsistence crops and seedlings ready for planting new coca areas; there were no side effects on forest vegetation near the sprayed plots; also noted were that the lots that had been abandoned show natural regeneration processes, with herbaceous vegetation and shrubs.

“In general and according to what was verified in all areas that contain illicit crops, the most important impact to the environment is being caused by the effect of indiscriminate logging and burning to which extensive areas of forest cover are being subjected, which put at risk the stability of the ecosystems and the environmental functions derived therefrom. There, agricultural activities are established, both licit and illicit, as are livestock activities, which further increase and enhance the deterioration of the natural environment.

“Taking into account that Resolution No. 017 of 2001 of the National Narcotics Board has delegated to the Anti-Narcotics Police, DIRAN, and to the National Narcotics Division, DNE, the responsibility to conduct the processing of complaints arising from the PECIG operation, these will be the entities that will issue the corresponding opinion on the findings of the field visit. In this regard, the Ministry verifies the performance of the activity by the entities listed, as part of compliance with the measures set out in Sheet No. 6 of the Environmental Management Plan.



“In keeping with the purpose of the visit and the considerations submitted, this opinion does not make additional or specific requirements to the other agencies responsible for implementing the Environmental Management Plan.

“The following documentation is part of this Technical Opinion:

Table of the coordinates of the verified sites, along with the respective map of location of verification points.

Similarly, attached are some photographs on three (3) pages, taken during the field visit conducted by this Ministry, which include both complaints verification activities and environmental monitoring.”

### **LEGAL CONSIDERATIONS**

In accordance with Article 8 of the Constitution it is the duty of the State and individuals to protect the natural and cultural wealth of the nation. (Underlining outside of text).

Similarly, Article 79 ibidem enshrines the right to enjoy a healthy environment, community participation, the State's duty to protect the diversity and integrity of the environment, preserve ecologically important areas and to promote education to meet those objectives.

Article 95, paragraph 8 of the rule in question states that it is the duty of citizens to “Protect the natural and cultural resources of the country and ensure the preservation of a healthy environment.”

Article 5 paragraph 35 of Law 99 of 1993 states that among the functions of this Ministry is the assessment, monitoring and control of environmental risk factors and of those that may affect the occurrence of natural disasters and coordinate with other relevant authorities the activities designed to prevent the emergence or prevent the spread of its effects.

Likewise the Ministry, under Article 33 of Decree 1220 of 2005 in force today, performs the control and monitoring of licensed activities, which states: “Control and Monitoring. The projects, works or activities subject to Environmental License or Environmental Management Plan during its construction, operation, dismantling or abandonment are controlled and monitored by the environmental authorities...”

Taking into account what is considered by the technical staff of the Directorate for Sustainable Sector Development, in relation to visitats conducted to the areas jurisdiction of the municipality of Cucuta, Sardinata and El Zulia in Norte de Santander and areas of the jurisdiction of the municipalities of San Vicente del Caguan, Puerto Rico, Montañita (Caquetá) and San José del Guaviare (Guaviare), this office will proceed to acknowledge the Technical Opinions No. 1753 of October 5, 2005 and No. 1823 of October 26, 2005 at the operative section of this administrative act.

Decree No.3266 of October 8, 2004 changing the structure of the Ministry of Environment, Housing and Territorial Development, the Division of Licenses, Permits and Procedures of the Ministry was created.

In accordance with the provisions of Resolution No. 1084, 2005, the Advisor of the Deputy Minister for the Environment, Division of Licenses, Permits and Environmental Procedures has the authority to sign administrative acts related to requirements and additional information to further the process of environmental licensing, permits and other instruments of environmental management and control and to proceed in actions brought against them.

In virtue of the foregoing,

### **DECIDES**

ARTICLE ONE. To declare, that taking into account the purpose of the visit conducted and what was established in the whereas section of this administrative document, to the effect that there is no adverse effect on the environment, the agencies responsible for the implementation for the Environmental Management Plan are not charged with any additional or particular requirements.

ARTICLE TWO. To continue with the obligations imposed by the Environmental Management Plan.

ARTICLE THREE. Through the User Relations Group of the Section of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representative of the Anti-Narcotics Police DIRAN and/or the duly appointed attorney

ARTICLE FOUR. Through the User Relations Group of the Section of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representative of the National Narcotics Directorate-DNE and/or the duly appointed attorney

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ARTICLE FIVE. Through the User Relations Group of the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal Representative of FUNDEPUBLICO, Ms. CLAUDIA SAMPEDRO TORRES and Mr. HECTOR SUAREZ, to CORPORACION APOYO and/or its attorney duly constituted.

ARTICLE SIX. Through the User Relations Group of the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal Representative of the Office of the OMBUDSMAN and/or its attorney duly constituted.

ARTICLE SEVEN. Through the User Relations Group the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Delegate Prosecutor for Environmental and Agricultural Affairs, the ICA, the Ministry of Social Protection, the Ministry of Interior and Justice, the National Narcotics Council, and the IGAC.

ARTICLE EIGHT. There is only recourse for reversal against this decision, and recourse must be entered within five (5) days following service of this notice as provided for in Articles 50, 51 and 52 of the Administrative Code.

**BE THIS SERVED, COMMUNICATED AND OBEYED**

*[Signed]*

**VANESSA VELEZ CABAL**

Advisor to the Deputy Minister of the Environment  
Section of Licenses, Permits and Environmental Procedures

Exp. 793

Draft: Luisa Fernanda Olaya – Contract Attorney DLPTA



**Annex 40-B**

**MINISTRY FOR THE ENVIRONMENT, *ORDER NO. 2283* WHEREBY A  
MONITORING OF THE EXECUTION OF THE ENVIRONMENTAL  
MANAGEMENT PLAN OF THE PROGRAM FOR THE ERADICATION OF  
ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG)  
IS CARRIED OUT, 21 DECEMBER 2005**

*(Archives of the Colombian Foreign Ministry)*





Ministry for the Environment, Housing and Territorial Development  
Licenses, Permits and Environmental Procedures Division  
Republic of Colombia

[21 DEC 2005]

Bogota, D.C.

**ORDER No. [2283]**  
“Deciding on requirements”

**THE ADVISOR OF THE DEPUTY MINISTER FOR THE ENVIRONMENT  
LICENSES, PERMITS AND ENVIRONMENTAL PROCEDURES DIVISION**

In exercise of the powers under Resolution No. 1084 of August 9, 2005 amending the Work and Minimum Requirements Handbook of the Ministry for the Environment, Housing and Territorial Development, and

**WHEREAS**

**BACKGROUND**

This Ministry, by Resolution No. 1065 of November 26, 2001, enforced the Environmental Management Plan for the activity called “Program for the Eradication of Illicit Crops by aerial spraying with glyphosate - PECIG” in the national territory.

The designated Environmental Management Plan as modified by this Ministry by Resolution No. 1054 of September 30, 2003, to adjust the Sheets that comprise it and to incorporate in its execution, in addition to the National Narcotics Directorate, other government entities such as Agustin Codazzi Geographical Institute - IGAC, National Institute of Health, the Anti-Narcotics Police and the Ministry of Interior and Justice.

In exercise of the powers of evaluation, control and monitoring established in Law 99 of 1993 and implementing regulations, the Division of Sustainable Sector Development of the Ministry for the Environment, Housing and Territorial Development has monitored activities currently underway in the Anti-Narcotics Police on environmental monitoring referred to in Sheet 5 of the Environmental Management Plan for PECIG referring to sampling of water, soil and vegetation in the Caquetá, Putumayo Nucleus of illicit crops.

The monitoring team of the Division of Sustainable Sector Development of the Ministry, in the exercise of those powers, developed the Technical OPINION 1898 of November 17, 2005, which stated:

**DEVELOPMENT OF ACTIVITIES**

|                       |  |
|-----------------------|--|
| Date of Commission    | October 29 – 31, 2005                      |
| Geographic Visit Area | Caquetá - Putumayo Nucleus of illicit crop |

[Page 1]

|                        |  |
|------------------------|--|
| Participating Entities | Colombian Agriculture Institute - ICA<br>National Narcotics Directorate - DNE<br>Anti-Narcotics Police - DIRAN<br>Aviation Area of the National Police - ARAVI<br>Ministry of Environment, Housing and Territorial Development |
|------------------------|--|

Prior to conducting field activities, a meeting was held in Larandia Military Base in the province of Caqueta, with the participation of officials from the participating institutions and Eradication and Aviation Areas of the National Police, to assess the security of the area and to schedule the activities to be implemented during descents to the monitoring points.

In consideration of the difficult public order situation occurring in the area, the entry to the monitoring sites required the support of eight armed helicopters, an air saving and rescue helicopter, intelligence service aircraft and ten Jungle units of the National Police as well as ground support by the National Army.

Advanced activity corresponds to the second phase of monitoring of this nucleus or post aspersion replica, including sampling of soil, water and vegetation of two plots already sprayed, as well as a control group that has not been sprayed, located within an indigenous reserve. The analysis of these samples will assess the residuality of the herbicide used by the Eradication Program for this particular nucleus in different periods of time.

The plots are located in the municipality of Orito, Putumayo, on the border with Ecuador. The geographical coordinates for each site are as follows:

| Plot | Geographical Coordinate |             | Spray Date                                     |
|------|-------------------------|-------------|--|
|      | North                   | West        |  |
| 1    | 00° 16' 06"             | 76° 46' 24" | July 14 - 2004                                 |
| 2    | 00° 16' 11"             | 76° 47' 57" | July 14 - 2004                                 |
| 3    | 00° 18' 04"             | 76° 53' 39" | Control group in reservation area, not sprayed |

[Page 2]

The aforementioned technical opinion considered the following:

- The collection of water and soil samples was conducted in accordance with the ICA protocols established for this purpose. These were properly packed, labeled and refrigerated for later transport to Bogota, fulfilling the corresponding chain of custody.
- The two lots sprayed show partial impact of the herbicide on the coca plantation, inferring that the spraying was done only on one part of the cultivated area, and that part of the sprayed underwent recovery practices such as looting.
- In the vicinity there are extensive plots with coca, mixed or intercropped with plantain and yucca, as well as seedlings in full production of coca plantlets.



- The plot located within the reservation area has a coca plantation with bushes surpassing 1.50 meters high, which indicates that the crop is older than one year; the site is not subject to total cultural practices for weed control, showing only one plating around each plant coca. The rest of the plot is covered with low growing natural grass.
- In the treated plots there was no collateral damage from spraying. Water samples were taken at points that are located outside the sprayed plots given that within these bodies there were no lotic or lentic waters.
- According to the monitoring protocol established in the Environmental Management Plan, the next monitoring phase for this Nucleus must be within a period of 60 days. The results obtained from the analysis of these samples will be evaluated comprehensively with the samples already taken and the remaining of the monitoring process for this Nucleus.
- The process of environmental monitoring for the definition of the residuality of glyphosate and its metabolite in the Caqueta - Putumayo illicit crop spraying Nucleus continues in accordance with the guidelines of the Environmental Management Plan - PECIG, following for these purposes, the protocols established for this activity.

[Page 3]

## LEGAL CONSIDERATIONS

In accordance with Article 8 of the Constitution, it is the responsibility of the State and individuals to protect the natural and cultural wealth of the Nation (Underscore outside of text)

Also, Article 79 *ibid* enshrines the right to enjoy a healthy environment, community participation, the State's duty to protect the diversity and integrity of the environment, conserve ecologically important areas and promote education for these purposes.

Article 95, section 8 of the charter provides that it is the duty of citizens "To protect the natural and cultural resources of the country and ensure the conservation of a healthy environment."

Article 5 section 35 of Law 99 of 1993 states that within the functions of this Ministry is the responsibility of the assessment, monitoring and control of environmental risk factors and of those that may affect the occurrence of natural disasters and the coordination with other authorities the activities designed to prevent the emergence or to prevent the spread of its effects.

Also this Ministry, under Article 33 of Decree 1220 of 2005 in force today, performs the control and monitoring of the activities licensed, which provides "*Control and Monitoring. The projects, works or activities subject to Environmental Licensing or Environmental Management Plan during their construction, operation, dismantling or abandonment, are subject to control and monitoring by the environmental authorities...*"

Taking into account what is considered by the technical team of the Sustainable Sector Development Department, regarding the visit to the Caquetá - Putumayo Nucleus of illicit crops, this office shall embrace the Technical Opinion No.1898 of November 17, 2005 in the operative part of this administrative act.

By Decree No. 3266 of October 8, 2004 changing the structure of the Ministry of Environment, Housing and Territorial Development, the Department of Licensing, Permits and Procedures of the Ministry was created.

In accordance with provisions of Resolution No. 1084, 2005, the Advisor to the Deputy Minister of the Environment, Department of Licenses, Permits and Environmental Procedures has the authority to sign the administrative acts related to requirements and additional information to promote the environmental licensing procedure, permits and other instruments ...

[Page 4]

...for the environmental control and management, and to decide in actions brought against them.

In virtue of the foregoing,

#### **DECIDES**

ARTICLE ONE. Declare that the environmental monitoring process for defining the residuality of glyphosate and its metabolite in the Caqueta - Putumayo nucleus of illicit crop spraying continues forward in accordance with the guidelines of the Environmental Management Plan PECIG, following fore these purposes, the established protocols for such activity.

ARTICLE TWO. Require the Anti-Narcotics Police to comply with the protocol established in the Environmental Management Plan for sampling, with respect to environmental monitoring of the activity of the different nuclei where PECIG operates, for which it must schedule and conduct the next monitoring phase for the Caqueta - Putumayo Nucleus, corresponding to the replica 60 days after spraying.

ARTICLE THREE. To declare that in accordance with the purpose of the visit to the Putumayo - Caqueta nucleus of illicit crops, and the considerations outlined in this administrative act, there are no additional or particular requirements in regard to the monitoring process established in the Environmental Management Plan –PECIG.

ARTICLE FOUR. Through the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal Representative of the Anti-Narcotics Police DIRAN and/or attorney duly constituted.

ARTICLE FIVE. Through the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal Representative of the National Narcotics Directorate-DNE and/or its attorney duly constituted.

ARTICLE SIX. Through the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal

Representative of FUNDEPUBLICO, to Dr. CLAUDIA TORRES SAMPEDRO and Dr. HECTOR SUAREZ, to the CORPORACION APOYO and/or attorney duly constituted

[Page 5]

ARTICLE SEVEN. Through the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Legal Representative of the Office of the OMBUDSMAN and/or its attorney duly constituted.

ARTICLE EIGHT. Through the Section of Licenses, Permits and Environmental Procedures of this Ministry, serve notice of the contents of this administrative act on the Delegate Prosecutor for Environmental and Agricultural Affairs, the ICA, the Ministry of Social Protection, the Ministry of Interior and Justice, the National Narcotics Council, and the IGAC.

ARTICLE NINE. There is only recourse for reversal against this decision, and recourse must be entered within five (5) days following service of this notice as provided for in Articles 50, 51 and 52 of the Administrative Code.

**BE THIS SERVED, COMMUNICATED AND OBEYED**

*[Signed]*

**VANESSA VELEZ CABAL**

Advisor to the Deputy Minister of the Environment  
Section of Licenses, Permits and Environmental Procedures

Exp. 793  
Draft: Luisa Fernanda Olaya – Contract Attorney DLPTA

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**Annex 41**

**LIST OF EXTERNAL ENVIRONMENTAL AUDITS BY THE NATIONAL  
NARCOTICS DIRECTORATE (DNE)**

*(Archives of the Colombian Foreign Ministry)*



**LIST OF EXTERNAL AUDITS – PROGRAMME FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE HERBICIDE**

| CONTRACTS            | DURATION                              | REPORTS  |
|----------------------|---------------------------------------|--|
| Contract 086 of 1994 | October 01 1994 to October 01 de 1995 | Report of activities carried out in the time period from 1 - 31 October 1994               |
|                      |                                       | Report of activities carried out in the time period from 1 - 30 November 1994              |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 December 1994              |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 January 1995               |
|                      |                                       | Report of activities carried out in the time period from 1 - 28 February 1995              |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 March 1995                 |
|                      |                                       | Report of activities carried out in the time period from 1 - 30 April 1995                 |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 May 1995                   |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 June 1995                  |
|                      |                                       | Report of activities carried out in the time period from 1 - 30 July 1995                  |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 August 1995                |
|                      |                                       | Report of activities carried out in the time period from 1 - 30 September 1995             |
|                      |                                       | Report of activities carried out in the time period from 1 - 19 October 1995               |
| Contract 065 of 1995 | October 18 1995 to November 18 1996   | Report of activities carried out in the time period from 20 October - 17 November 1995     |
|                      |                                       | Report of activities carried out in the time period from 20 de November - 22 December 1995 |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 January 1996               |
|                      |                                       | Report of activities carried out in the time period from 1 - 28 February 1996              |
|                      |                                       | Report of activities carried out in the time period from 1 - 31 March 1996                 |

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|                      |                                      |  |
|----------------------|--------------------------------------|--|
|                      |                                      | Report of activities carried out in the time period from 1 - 30 April 1996             |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 May 1996               |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 June 1996              |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 July 1996              |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 August 1996            |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 September 1996         |
|                      |                                      | Report of activities carried out in the time period from 1 - 18 October 1996           |
|                      |                                      | Report of activities carried out in the time period from 20 October - 17 November 1996 |
| Contract 082 of 1996 | 05 December 1996 to November 05 1997 | Report of activities carried out in the time period from 1 - 31 December 1996          |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 January 1997           |
|                      |                                      | Report of activities carried out in the time period from 1 - 28 February 1997          |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 March 1997             |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 April 1997             |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 May 1997               |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 June 1997              |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 July 1997              |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 August 1997            |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 September 1997         |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 October 1997           |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 November 1997          |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 December 1997          |



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|   |   |   |
|---|---|---|
| Contract 001<br>of 1998   | 08 January<br>1998, plus<br>addition of one<br>more month<br>until 08 June<br>2000. | Report of activities carried out in the time period from 1 -<br>31 January 1998   |
|   |   | Report of activities carried out in the time period from 1 -<br>28 February 1998  |
|   |   | Report of activities carried out in the time period from 1 -<br>31 March 1998     |
|   |   | Report of activities carried out in the time period from 1 -<br>30 April 1998     |
|   |   | Report of activities carried out in the time period from 1 -<br>31 May 1998       |
|   |   | Report of activities carried out in the time period from 1 -<br>30 June 1998      |
|   |   | Report of activities carried out in the time period from 1 -<br>31 July 1998      |
|   |   | Report of activities carried out in the time period from 1 -<br>31 August 1998    |
|   |   | Report of activities carried out in the time period from 1 -<br>30 September 1998 |
|   |   | Report of activities carried out in the time period from 1 -<br>31 October 1998   |
|   |   | Report of activities carried out in the time period from 1 -<br>30 November 1998  |
|   |   | Report of activities carried out in the time period from 1 -<br>31 December 1998  |
|   |   | Report of activities carried out in the time period from 1 -<br>31 January 1999   |
|   |   | Report of activities carried out in the time period from 1 -<br>28 February 1999  |
|   |   | Report of activities carried out in the time period from 1 -<br>31 March 1999     |
|   |   | Report of activities carried out in the time period from 1 -<br>30 April 1999     |
|   |   | Report of activities carried out in the time period from 1 -<br>31 May 1999       |
|   |   | Report of activities carried out in the time period from 1 -<br>30 June 1999      |
|   |   | Report of activities carried out in the time period from 1 -<br>31 July 1999      |
|   |   | Report of activities carried out in the time period from 1 -<br>31 August 1999    |
| Report of activities carried out in the time period from 1 -<br>30 September 1999 |   |   |

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|                      |  |  |
|----------------------|--|--|
|                      |  | Report of activities carried out in the time period from 1 - 31 October 1999   |
|                      |  | Report of activities carried out in the time period from 1 - 30 November 1999  |
|                      |  | Report of activities carried out in the time period from 1 - 31 December 1999  |
|                      |  | Report of activities carried out in the time period from 1 - 31 January 2000   |
|                      |  | Report of activities carried out in the time period from 1 - 28 February 2000  |
|                      |  | Report of activities carried out in the time period from 1 - 31 March 2000     |
|                      |  | Report of activities carried out in the time period from 1 - 30 April 2000     |
|                      |  | Report of activities carried out in the time period from 1 - 31 May 2000       |
|                      |  | Report of activities carried out in the time period from 1 - 30 June 2000      |
| Contract 019 of 2000 | 28 July 2000 and the addition of 1,5 months, until 13 December 2000. | Report of activities carried out in the time period from 1 - 31 July 2000      |
|                      |  | Report of activities carried out in the time period from 1 - 31 August 2000    |
|                      |  | Report of activities carried out in the time period from 1 - 30 September 2000 |
|                      |  | Report of activities carried out in the time period from 1 - 31 October 2000   |
|                      |  | Report of activities carried out in the time period from 1 - 30 November 2000  |
|                      |  | Report of activities carried out in the time period from 1 - 31 December 2000  |
| Contract 001 of 2001 | 4 January to 22 September 2001                                       | Report of activities carried out in the time period from 1 - 31 January 2001   |
|                      |  | Report of activities carried out in the time period from 1 - 28 February 2001  |
|                      |  | Report of activities carried out in the time period from 1 - 31 March 2001     |
|                      |  | Report of activities carried out in the time period from 1 - 30 April 2001     |
|                      |  | Report of activities carried out in the time period from 1 - 31 May 2001       |
|                      |  | Report of activities carried out in the time period from 1 - 30 June 2001      |

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|                                      |                                      | Report of activities carried out in the time period from 1 - 31 July 2001      |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 August 2001    |
|                                      |                                      | Report of activities carried out in the time period from 1 - 30 September 2001 |
| Contract 035 of 2001                 | 24 September to 31 December 2001     | Report of activities carried out in the time period from 1 - 31 October 2001   |
|                                      |                                      | Report of activities carried out in the time period from 1 - 30 November 2001  |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 December 2001  |
| Contract 001 of 2002 and an addition | 1 January to 27 August 2002          | Report of activities carried out in the time period from 1 - 31 January 2002   |
|                                      |                                      | Report of activities carried out in the time period from 1 - 28 February 2002  |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 March 2002     |
|                                      |                                      | Report of activities carried out in the time period from 1 - 30 April 2002     |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 May 2002       |
|                                      |                                      | Report of activities carried out in the time period from 1 - 30 June 2002      |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 July 2002      |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 August 2002    |
| Contract 026 of 2002                 | 30 August to 29 October 2002         | Report of activities carried out in the time period from 1 - 30 September 2002 |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 October 2002   |
| Contract 033 of 2002                 | 21 November 2002 to 20 April de 2003 | Report of activities carried out in the time period from 1 - 30 November 2002  |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 December 2002  |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 January 2003   |
|                                      |                                      | Report of activities carried out in the time period from 1 - 28 February 2003  |
|                                      |                                      | Report of activities carried out in the time period from 1 - 31 March 2003     |

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|                      |                                      | Report of activities carried out in the time period from 1 - 30 April 2003     |
| Contract 019 of 2003 | 7 May to 6 September 2003            | Report of activities carried out in the time period from 1 - 31 May 2003       |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 June 2003      |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 July 2003      |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 August 2003    |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 September 2003 |
|                      |                                      |  |
| Contract 040 of 2003 | 10 September 2003 to 9 January 2004  | Report of activities carried out in the time period from 1 - 30 November 2003  |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 December 2003  |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 January 2004   |
|                      |                                      |  |
| Contract 001 of 2004 | 21 January to 21 March 2004          | Report of activities carried out in the time period from 1 - 31 March 2004     |
|                      |                                      |  |
| Contract 013 of 2004 | 5 April to 5 August 2004             | Report of activities carried out in the time period from 1 - 31 May 2004       |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 June 2004      |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 July 2004      |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 August 2004    |
|                      |                                      |  |
| Contract 033 of 2004 | 27 September 2004 - 26 February 2005 | Report of activities carried out in the time period from 1 - 31 October 2004   |
|                      |                                      | Report of activities carried out in the time period from 1 - 30 November 2004  |
|                      |                                      | Report of activities carried out in the time period from 1 - 31 December 2004  |
|                      |                                      |  |

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|                      |   |  |
|----------------------|---|--|
|                      |   | Report of activities carried out in the time period from 1 - 31 January 2005   |
|                      |   | Report of activities carried out in the time period from 1 - 28 February 2005  |
| Contract 034 of 2005 | 27 March 2005 - 24 May 2005   | Report of activities carried out in the time period from 1 - 31 March 2005     |
|                      |   | Report of activities carried out in the time period from 1 - 30 April 2005     |
|                      |   | Report of activities carried out in the time period from 1 - 31 May 2005       |
| Contract 015 of 2005 | 25 May 2005 – 25 February 2006, for two additions it is extended until 14 July 2006 | Report of activities carried out in the time period from 1 - 30 June 2005      |
|                      |   | Report of activities carried out in the time period from 1 - 31 July 2005      |
|                      |   | Report of activities carried out in the time period from 1 - 31 August 2005    |
|                      |   | Report of activities carried out in the time period from 1 - 30 September 2005 |
|                      |   | Report of activities carried out in the time period from 1 - 31 October 2005   |
|                      |   | Report of activities carried out in the time period from 1 - 30 November 2005  |
|                      |   | Report of activities carried out in the time period from 1 - 31 December 2005  |
|                      |   | Report of activities carried out in the time period from 1 - 31 January 2006   |
|                      |   | Report of activities carried out in the time period from 1 - 28 February 2006  |
|                      |   | Report of activities carried out in the time period from 1 - 31 March 2006     |
|                      |   | Report of activities carried out in the time period from 1 - 30 April 2006     |
|                      |   | Report of activities carried out in the time period from 1 - 31 May 2006       |
|                      |   | Report of activities carried out in the time period from 1 - 30 June 2006      |
|                      |   | Report of activities carried out in the time period from 1 - 31 July 2006      |
| Contract 027 of 2006 | 9 October 2006 to 9 December 2006   | Report of activities carried out in the time period from 1 - 31 October 2006   |
|                      |   | Report of activities carried out in the time period from 1 - 30 November 2006  |

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|                      |                                     |  |
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|                      |                                     | Report of activities carried out in the time period from 1 - 31 December 2006  |
| Contract 032 of 2007 | 17 January 2007 to 16 November 2007 | Report of activities carried out in the time period from 1 - 31 January 2007   |
|                      |                                     | Report of activities carried out in the time period from 1 - 28 February 2007  |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 March 2007     |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 April 2007     |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 May 2007       |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 June 2007      |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 July 2007      |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 August 2007    |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 September 2007 |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 October 2007   |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 November 2007  |
| Contract 051 of 2008 | 9 December 2008 - 9 December 2009   | Report of activities carried out in the time period from 1 - 31 December 2008  |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 January 2009   |
|                      |                                     | Report of activities carried out in the time period from 1 - 28 February 2009  |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 March 2009     |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 April 2009     |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 May 2009       |
|                      |                                     | Report of activities carried out in the time period from 1 - 30 June 2009      |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 July 2009      |
|                      |                                     | Report of activities carried out in the time period from 1 - 31 August 2009    |

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|  |  |  |
|--|--|--|
|  |  | Report of activities carried out in the time period from 1 - 30 September 2009 |
|  |  | Report of activities carried out in the time period from 1 - 31 October 2009   |
|  |  | Report of activities carried out in the time period from 1 - 30 November 2009  |
|  |  | Report of activities carried out in the time period from 1 - 31 December 2009  |



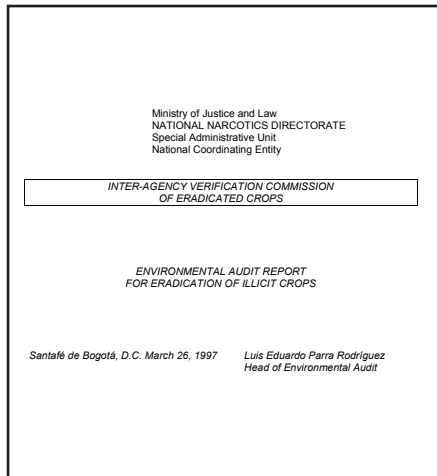


**Annex 41-A**

**INTER-AGENCY COMMISSION FOR THE VERIFICATION OF ERADICATED CROPS  
(DNE, DIRAN, AND FOREIGN EXPERTS FROM USDA/ARS AND  
INL-WASHINGTON), *REPORT ON THE ENVIRONMENTAL AUDIT FOR THE  
ERADICATION OF ILLICIT CROPS, BOGOTÁ, 26 MARCH 1997***

*(Archives of the Colombian Foreign Ministry)*





*Santafé de Bogotá, D.C. April 15, 1997*

*AA-0140.97*

*Mr.  
JOAQUIN POLO MONTALVO  
National Narcotics Director  
Bogotá*

*Dear Dr. Polo:*

*Please find enclosed the "Inter-Agency Verification Commission of Eradicated Crops" report, conducted on February 26 and 27, 1997 on coca and poppy crops.*

*Cordially*

*[Signed]  
LUIS EDUARDO PARRA RODRIGUEZ  
Auditor*

## **PRESENTATION**

This document is a continuation of the verification process on the effectiveness of aerial spraying with glyphosate and eradication rates of illicit coca and poppy. The report emphasizes field work done by the verification commission, and comprises, as the previous reports, a technical memory and photographic record where the results and conclusions of the verification process or procedure can be seen, based on an agreed methodology.

The participation in such verification is part of the activities that must be complied with by the Environmental Audit for the execution of Contract 082/96.

One of the major results seen by the Commission in this Verification, has to do with the proven effectiveness of the glyphosate herbicide, applied under the technical and environmental parameters set out for the aerial spraying for the eradication of coca and poppy. This fact that was recognized by part of the foreign experts from USDA/ARS and INL in Washington, particularly, from Dr. Charles Helling and John McLaughlin.

As the methodology used in previous reports, the results, conclusions, and considerations of this report are supported on a photographic sequence of illustrative and proven character, which covers the different regions and/or verified plots. Its biogeographical context corresponds to the municipalities of Miraflores and El Retorno (Guaviare), in the case of coca; and Planadas, Rioblanco and Chaparral (Tolima) in the case of poppy. The Committee of national and foreign experts conducted their work between February 25 and 27, 1997.

[Page 1]

Likewise, we mention that the verification process was conducted following the “Joint Verification Procedure for the Control of Illicit Coca Crops” prepared in October /96, and agreed between DIRAN, D.N.E.<sup>1</sup> and for this purpose, the inter-disciplinary participation was comprised by:

| <b>NAME</b>                | <b>TITLE</b>                            | <b>ENTITY</b>       |
|----------------------------|---|---------------------|
| Col. Carlos T. Ballesteros | Under-Director Antinarcotics Police     | DIRAN               |
| May. Francisco J. Yunis V  | Head of Illicit Crops Eradication Block | DIRAN               |
| Dr. Carlos Gallego         | Head of the Verification Division       | DIRAN               |
| Dr. Susana Huffington      | Head of Internal Control                | D.N.E.              |
| Mr. John McLaughlin        | INL – Washington                        | US Dept. /USA       |
| Mr Víctor Abeyta           | NAS Director                            | USA Embassy         |
| Dr. Charles Helling        | USDA Scientist                          | USDA/ARS-USA        |
| Eng. Luis Eduardo Parra    | Director of Environmental Audit         | Environmental Audit |

[Page 2]

<sup>1</sup> This document was summarized and became the verification protocol signed between the Ministry of Defense and the United States Embassy. The present process maintains the variable corresponding to the randomized sample with a percentage of reliability.

## 2. BACKGROUND AND JUSTIFICATION

Since its inception, the Program has practices and procedures for verification, which have been improved and complemented until arriving to this procedure. Past efforts and experiences are very important, since it has been possible to build today's model and practices.

Verification has been directed towards activities of: overall aerial reconnaissance, detailed aerial reconnaissance and "*in-situ*" reconnaissance of sprayed plots and regions.

The current procedure is explained by the need to establish an agreed mechanism for assessing and quantifying eradication results by the glyphosate spraying method, taking into account that statistics on 1995 and 1996 eradication had differences. For these reasons, the governments of Colombia and the United States developed a protocol to address the issue of eradication of illicit crops.

This verification was performed with the participation of Dr. Charles Helling, a USDA/ARS weed expert scientist, and Mr. John McLaughlin, a Department of State expert. With these scientists, the purpose was to verify the effectiveness of the program based on a randomized sample, chosen by them, from the "Pathlink" and/or "Satloc" registers delivered by Dyncorp.

[Page 3]

### 3. WORK DONE

The work undertaken for the implementation of the Verification is shown in detail in the following table:

| WORK DONE FOR VERIFICATION OF ILLICIT COCA AND POPPY CROPS |  |                                      |  |
|--|--|--------------------------------------|--|
| DATE   | ACTIVITY   | REGION/<br>MUNICIPALITY              | COMMENTS   |
| 26-02-97   | Verification planning on coca illicit crops, overflights, etc.                 | Guaviare                             | Work done by DIRAN, DYNCORP and Environmental Audit                              |
|  | Selection and determination of coordinates of plots to be verified.            | Guaviare                             | Work done by NAS through their "Pathlink" and "Satloc" <sup>2</sup> register     |
|  | " <i>in-situ</i> " verification  | El Retorno and Miraflores (Guaviare) | Commission work in 2 plots. Around Miraflores (1) and El Retorno (1)             |
| 27-02-97   | Verification planning on poppy illicit crops, overflights, displacements, etc. | Tolima                               | Work done by DIRAN, NAS and Environmental Audit.                                 |
|  | Determination of coordinates of plots to be verified.                          | Tolima                               | Work done by NAS and DIRAN from "Pathlink" register and spraying notes.          |
|  | " <i>in-situ</i> " verification  | Rioblanco and Chaparral (Tolima)     | Detailed verification was done from the helicopter. Commission work <sup>3</sup> |

[Page 4]

<sup>2</sup> Software used by NAS/USA through DYNCORP for aerial spraying control activities, aerial reconnaissance and planning of eradication activities.

<sup>3</sup> Given the limitation of the operating capacity of the H1-UH helicopters to land on plots, it was decided to make a detailed reconnaissance overflight on each pre-selected plot and PHOTO taking. This is possible on illicit poppy crops given their evident death by aerial spraying with glyphosate.

#### **4. SELECTION AND REPRESENTATIVE QUALITY OF THE SAMPLES TO BE VERIFIED**

To establish this critical issue, the following criteria were taken into account, which form an integral part of the Verification Procedures, as follows:

1. Random selection of a sample of sprayed plots 128 and 227 days prior to verification, in the case of coca, which represents approximately 3.45% of total spray during July and October, 1996. In the case of poppy, sprayed plots were selected 86, 77, 53, 31, 21 and 5 days before, corresponding to the months of December 1996, January and February 1997.
2. Determination of plots to verify from computer records established by the "Pathlink, Analyzer" and "SATLOC" system and provided by NAS/DYNCORP.
3. Estimation of eradicated areas, based on the opinion of experts on damage assessment which disable coca plantations for drug production, at least for 1 year. In the case of poppy, the criterion is that it is out of production for one harvest.
4. The results expressed on the effectiveness of aerial spraying were made in terms of percentage of damage to the plot, with an inherent margin of error (experts estimate).

The above criteria are expressed in the results shown in TABLES No. 4.1 and 4.2

[Page 5]



**TABLE NO. 4.1****SPRAYED AREA IN THE PERIOD AND PERCENTAGE OF SAMPLE – COCA-LEAF**

| DEPARTMENT   | MUNICIPALITY | SPRAYED AREA (ha) |                | SAMPLE                   |               |
|--------------|--------------|-------------------|----------------|--------------------------|---------------|
|              |              | JULY              | OCTOBER        | AREA (ha) <sup>(1)</sup> | %             |
| Guaviare     | El Retorno   | -                 | 1447.34        | 4                        | 0.3           |
|              | Miraflores   | 635.0             | -              | 20                       | 3.15          |
| <b>TOTAL</b> |              | <b>635.0</b>      | <b>1447.34</b> | <b>24</b>                | <b>Σ 3.45</b> |

- (1) The sample area is the sum of average of estimated areas in each plot and selected by USA experts  
 - This verification was made in the presence of a USDA/ARS scientist and an INL-Washington expert.

**TABLE NO. 4.2****SPRAYED AREA IN THE PERIOD AND PERCENTAGE OF SAMPLE – OPIUM POPPY**

| DEPARTMENT   | MUNICIPALITY | SPRAYED AREA (ha) |            |            | SAMPLE <sup>(1)</sup> |               |
|--------------|--------------|-------------------|------------|------------|-----------------------|---------------|
|              |              | DECEMBER          | JANUARY    | FEBRUARY   | AREA (ha)             | %             |
| Tolima       | Planadas     | -                 | 130        | 100        | 125                   | 54.34         |
|              | Rioblanco    | 69                | 50         | 150        | 119                   | 44.23         |
|              | Chaparral    | 100               | -          | -          | 46                    | 46.0          |
| <b>TOTAL</b> |              | <b>169</b>        | <b>180</b> | <b>250</b> | <b>290</b>            | <b>48.41*</b> |

- (1) The coca sample is large since all sprayed nucleus was overflowed.  
 \* This percentage results from comparing total sample area with total sprayed area during this quarter.

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## **5. CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 COCA ERADICATION**

In general terms, conclusions and recommendations, based on verification conducted in this period, are similar to the previous, as follows:

- Overall reliability criteria set out in the agreed procedure were observed with the greatest scientific rigor. Under these conditions, coca eradication, on a sample of 3.45% of the sprayed universe, showed an eradication rate of 90%-100%, according to field observations, as shown in Table No. 5.1
- The invasion of natural vegetation (grasses and herbaceous) of forests destroyed, is abundant and aggressive, especially in those plots that were not subjected to indiscriminate and uncontrolled use of agrochemicals during the cultivation process (herbicides, foliar fertilizers, insecticides, etc.)
- Arboreal vegetation and shrubs were observed surrounding sprayed plots, without any adverse effect. Likewise, the presence of entomological fauna on the upper soil layer was observed (arthropods, termites, annelids and arachnids)

### **5.2 POPPY ERADICATION**

As for the case of coca, verification results on Program efficiency on poppy crops are the following:

[Page 7]

- Poppy eradication, on a sample of 48.41% of the sprayed universe, showed an eradication rate between 90% and 100% according to the range estimated by the Commission<sup>4</sup> The observations are shown in Table 5.2
- According to these eradication estimates, it can be said that all sprayed poppy was eradicated.
- In general, there was a significant decrease in the area with illicit poppy crops in the verified area. In turn, these areas have been destined to extensive cattle raising, an inappropriate activity in this type of soil, thus creating pastured Andean cloud forest.

- [Page 8]

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<sup>4</sup> This sample is as high as possible, since the verification process is based mainly on detailed aerial reconnaissance, taking into account landing difficulties. This procedure helps the quick wilting of poppies (maximum 8 days after spraying), a situation that makes death evident

TABLE NO. 5.1

**VERIFICATION OF EFFECTIVE DEATH OF ILLICIT COCA-LEAF CROPS BY AERIAL SPRAYING IN THE DEPARTMENT OF GUAVIARE**

| SPRAYING DATE <sup>(1)</sup> | SITE OR PLOT | SITE OR REGION | PATHLINK COORDINATES <sup>(2)</sup> | FIELD COORDINATES <sup>(3)</sup> | PLOT SIZE <sup>(4)</sup><br>(HA) | DEATH PERCENTAGE (%) <sup>(5)</sup> |             |
|------------------------------|--------------|----------------|-------------------------------------|----------------------------------|----------------------------------|-------------------------------------|-------------|
|                              |              |                |                                     |                                  |                                  | MIN RANGE                           | MAX RANGE   |
| 08/07/96                     | 1            | Mrafloros      | N 01°25,09' W 71° 58,73'            | N 01°24,230' W 71° 58,703'       | 15 - 20                          | 85                                  | 95          |
| 18/10/96                     | 2            | El Retorno     | N 02°16,17' W 72° 33,37'            | N 02°16,609' W 72° 33,530'       | 4                                | 95                                  | 100         |
|                              |              |                |                                     |                                  |                                  |                                     |             |
|                              |              |                |                                     |                                  |                                  |                                     |             |
| <b>TOTALS</b>                | -            | -              | -                                   | -                                | <b>19-24</b>                     | <b>90.0</b>                         | <b>97.5</b> |

- (1) Dated recorded in "Pathlink" listings  
(2) Coordinates taken directly from "Pathlink" listings  
(3) Coordinates taken with GP.S., manual. Its precision is high and is based where the helicopter lands.  
(4) Sizes estimated by experts in field (NAS advisor pilot, Colombian pilots and engineers from Environmental Audit), based on aerial reconnaissance in helicopter and visual appreciation "in-situ"  
(5) Estimate based on wilting and total death of plants in overall plot

TABLE NO. 5.2

**VERIFICATION OF EFFECTIVE DEATH OF ILLICIT POPPY CROPS BY AERIAL SPRAYING IN THE DEPARTMENT OF TOLIMA**

| SPRAYING DATE <sup>(1)</sup> | SITE OR PLOT | SITE OR REGION | PATHLINK COORDINATES <sup>(2)</sup> | FIELD COORDINATES <sup>(3)</sup> | PLOT SIZE <sup>(4)</sup><br>(HA) | DEATH PERCENTAGE (%) <sup>(5)</sup> |             |
|------------------------------|--------------|----------------|-------------------------------------|----------------------------------|----------------------------------|-------------------------------------|-------------|
|                              |              |                |                                     |                                  |                                  | MIN RANGE                           | MAX RANGE   |
| 04/12/96                     | 1            | Chaparral      | N 03°39,38' W 75° 39,30'            | N 03°39,380' W 75° 39,300'       | 46 <sup>(6)</sup>                | 85                                  | 95          |
| 12/12/96                     | 2            | Rioblanco      | N 03°26,80' W 75° 54,1'             | N 03°27,100' W 75° 50,600'       | 46                               | 90                                  | 95          |
| 12/12/96                     | 3            | Rioblanco      | N 03°20,10' W 75° 48,5'             | N 03°20,100' W 75° 43,500'       | 23                               | 85                                  | 95          |
| 05/01/97                     | 4            | Rioblanco      | N 03°27,55' W 75° 49,19'            | N 03°27,550' W 75° 45,190'       | 50                               | 90                                  | 95          |
| 20/01/97                     | 5            | Planadas       | N 03°03,59' W 75° 42,01'            | N 03°03,590' W 75° 42,010'       | 50                               | 90                                  | 95          |
| 06/02/97                     | 6            | Planadas       | N 02°59,80' W 75° 45,30'            | N 02°59,00' W 75° 40,44'         | 50                               | 90                                  | 95          |
| 22/02/97                     | 7            | Planadas       | N 02°58,24' W 75° 46,48'            | N 02°58,240' W 75° 46,480'       | 25                               | 90                                  | 95          |
| <b>TOTALS</b>                | -            | -              | -                                   | -                                | <b>290</b>                       | <b>88.57</b>                        | <b>95.0</b> |

- (1) Dated recorded in "Pathlink" listings  
(2) Coordinates taken directly from "Pathlink" listings  
(3) Coordinates taken with GP.S., manual. Its precision is high and is based where the helicopter lands.  
(4) Sizes estimated by experts in field (NAS advisor pilot, Colombian pilots and engineers from Environmental Audit), based on aerial reconnaissance in helicopter and visual appreciation "in-situ"  
(5) Estimation based on wilting and total death of plants in overall plot  
(6) Plot size was taken based on sprayed area on fumigation date, since an overflight was made on all sprayed area.

## PLOT NO. 1



|   |                         |
|---|-------------------------|
| PHOTO NO. VC 10   | ROLL: RVC 137           |
| LOCATION: N 01° 24,230 W 71° 58,703'  | Miraflores – Guaviare   |
| VERIFICATION DATE: 26/02/97   | SPRAYING TIME: 227 days |
| <b>COMMENTS:</b> <ul style="list-style-type: none"> <li>• Plot sprayed on 08/07/96 in the Miraflores area, with an extension of 15-20 ha.</li> <li>• Death of plot was considered by USDA/ARS expert in at least 90%</li> <li>• Note the invasion of natural vegetation (pastures and herbaceous). It can be observed that some plants have some non-productive leaves and their stem is completely necrotic (death)</li> </ul> |                         |

## PLOT NO. 1



|   |                         |
|---|-------------------------|
| PHOTO NO. VC 11   | ROLL: RVC 137           |
| LOCATION: N 01° 24,230 W 71° 58,703'  | Miraflores – Guaviare   |
| VERIFICATION DATE: 26/02/97   | SPRAYING TIME: 227 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Plot located in Miraflores-Guaviare. This plot was selected by US experts for verification.</li> <li>• Approximate size: 15 – 20 ha</li> <li>• Note US expert inspecting effective death of coca plants and of overall plot</li> <li>• This plot was assigned 90% control according to US members of the commission</li> </ul> |                         |

## PLOT NO. 1



|   |                         |
|---|-------------------------|
| PHOTO NO. VC 16   | ROLL: RVC 137           |
| LOCATION: N 01° 24,230 W 71° 58,703'  |                         |
| VERIFICATION DATE: 26/02/97   | SPRAYING TIME: 227 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Plot located in Miraflores-Guaviare. Approximate size 15-20 ha, sprayed on 08/07/96</li> <li>• Observe flight (1) Some sectors were not sprayed due to radial method and no overlapping of flight lines</li> <li>• Note coca plant completely dead in foreground. 90% plot control. The Commission considered this plot out of production and observed completely abandoned.</li> <li>• See woody vegetation, with no damage.</li> </ul> |                         |

## PLOT NO. 2



|  |                         |
|--|-------------------------|
| PHOTO NO. VC 19  | ROLL: RVC 137           |
| LOCATION: N 02° 16,609 W 72° 33,530'   | El Retorno              |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: 128 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• See Mr. John McLaughlin (INL-Washington) examining aerial spraying results with glyphosate</li> <li>• Coca is completely dead and control was 100% in sprayed plot. Note invasion of grass and herbaceous species in plot.</li> </ul> |                         |



## PLOT NO. 2



|  |                         |
|--|-------------------------|
| PHOTO NO. VC 20  | ROLL: RVC 137           |
| LOCATION: N 02° 16,609 W 72° 33,530'   |                         |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: 128 days |
| <b>COMMENTS:</b> • Note completely necrotic (dead tissue) logs and branches. |                         |

## PLOT NO. 2



|  |                         |
|--|-------------------------|
| PHOTO NO. VC 21  | ROLL: RVC 121           |
| LOCATION: N 02° 16,609 W 72° 33,530'   |                         |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: 128 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• See Dr. Charles Helling (USDA Scientist) descending from helicopter to examine coca crop sprayed with glyphosate</li> <br/> <li>• See coca is completely dead. 100% control.</li> </ul> |                         |

## PLOT NO. 2



|  |                         |
|--|-------------------------|
| PHOTO NO. VC 22  | ROLL: RVC 137           |
| LOCATION: N 02° 16,609 W 72° 33,530'   |                         |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: 128 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Plot sprayed with glyphosate on 18/10/96.</li> <li>• See members of the USDA/ARS mission and Department of State inspecting foliar and woody material of a coca plant sprayed with glyphosate, which is necrotic, rosette and with no possibilities of being used for cocaine production</li> <li>• See coca plot, completely death</li> <li>• Some signs of leaves are twisted, chlorotic and non-productive.</li> </ul> |                         |

**PLOT NO. 1**

|  |                          |
|--|--------------------------|
| PHOTO NO. VC 27  | ROLL: RVC 137            |
| LOCATION: N 03° 39,380 W 75° 39,300'   |                          |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: ± 86 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Plot located in Chaparral-Tolima, towards San José de las Hermosas.</li> <li>• See 90% of poppy planted area was eradicated</li> <li>• See natural forest unaffected by aerial spraying.</li> </ul> |                          |

## PLOT NO. 1



|  |                          |
|--|--------------------------|
| PHOTO NO. VC 29  | ROLL: RVC 137            |
| LOCATION: N 03° 39,380 W 75° 39,300'   | Chaparral                |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: ± 86 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• See tree vegetation undamaged by aerial spraying with glyphosate.</li> <li>• See rabbit or small area of poppy crop left unsprayed; however, crop was abandoned because probably this small area did not yield any profit.</li> </ul> |                          |

## PLOT NO. 2



|  |                          |
|--|--------------------------|
| PHOTO NO. VC 31  | ROLL: RVC 137            |
| LOCATION: N 03° 27,100 W 75° 50,600'   |                          |
| VERIFICATION DATE: 26/02/97  | SPRAYING TIME: ± 77 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Plot located in the jurisdiction of Rioblanco – Tolima.</li> <li>• See flight trail (1) effective for the eradication of illicit coca crop</li> <li>• Note that eradicated areas are destined for extensive cattle raising, an inadequate activity in this type of soils and physiography.</li> <li>• In (2) plots which in previous years were sprayed and are in the process of natural regeneration or restoration.</li> </ul> |                          |

## PLOT NO. 3



|  |                        |
|--|------------------------|
| PHOTO NO. VC 32  | ROLL: RVC 137          |
| LOCATION: N 03° 20,100 W 75° 48,600'   | Rioblanco - Tolima     |
| VERIFICATION DATE: 27/02/97  | SPRAYING TIME: 77 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Observe destruction of cloud forest for illicit crops which, after being eradicated, are abandoned leaving only a forest cemetery.</li> <li>• Coca illicit crop was completely eradicated.</li> </ul> |                        |

PLOT NO. 4



|  |                          |
|--|--------------------------|
| PHOTO NO. VC 35  | ROLL: RVC 137            |
| LOCATION: N 03° 27,550 W 75° 45,190'   | Rioblanco - Tolima       |
| VERIFICATION DATE: 27/02/97  | SPRAYING TIME: ± 53 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Observe maize crop (1) undamaged and eradicated poppy.</li> <li>• See that the trend in establishing illicit crops is to look for areas towards higher elevations.</li> </ul> |                          |



## PLOT NO. 4



|   |                          |
|---|--------------------------|
| PHOTO NO. VC 36A  | ROLL: RVC 137            |
| LOCATION: N 03° 27,550 W 75° 45,190'  | Rioblanco                |
| VERIFICATION DATE: 27/02/97   | SPRAYING TIME: ± 53 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Destruction, slash and burn, and deforestation are common in illicit crops.</li> <li>• (1) See total poppy destruction.</li> <li>• (2) See newly planted poppy, not more than 30 - 45 days.</li> </ul> |                          |

## PLOT NO. 5

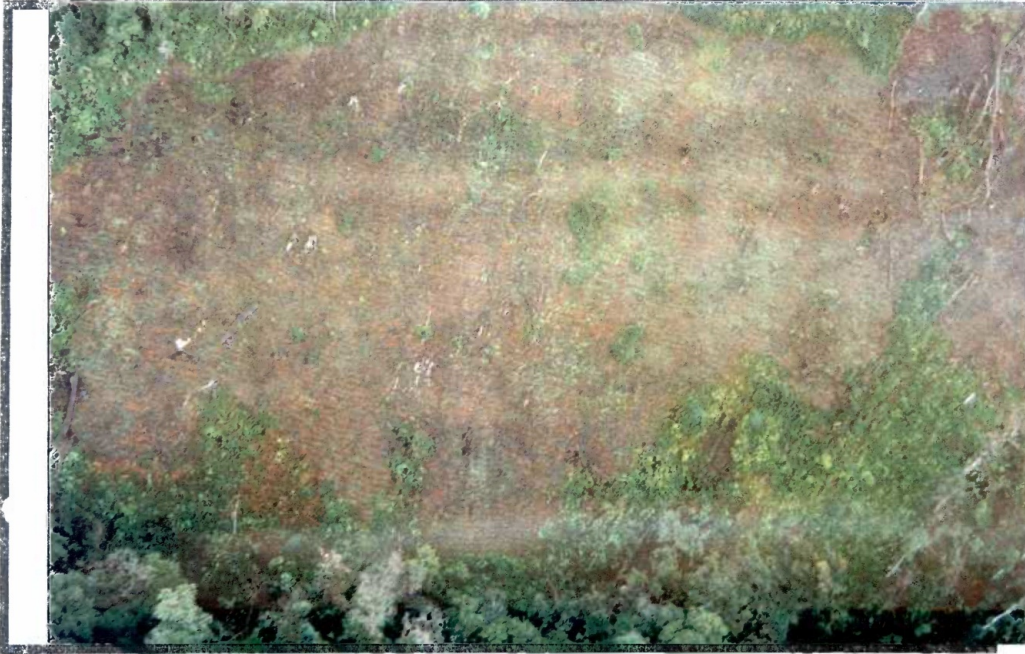


|   |                        |
|---|------------------------|
| PHOTO NO. VC 4  | ROLL: RVA 138          |
| LOCATION: N 03° 03,590 W 75° 42,010'  | Planadas / Tolima      |
| VERIFICATION DATE: 27/02/97   | SPRAYING TIME: 37 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Nucleus completely eradicated. Its approximate area was 50 ha (100).</li> <li>• Observe recent poppy in among the remains of the trees.</li> </ul> |                        |

## PLOT NO. 6



|  |                        |
|--|------------------------|
| PHOTO NO. VC 14  | ROLL: RVC 138          |
| LOCATION: N 03° 59' W 75° 40,44'   | Planadas / Tolima      |
| VERIFICATION DATE: 27/02/97  | SPRAYING TIME: 21 days |
| <b>COMMENTS:</b> • See over 90% eradication of cultivated land. Nucleus was 75 ha. |                        |

**PLOT NO. 7**

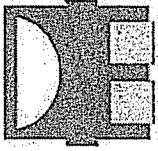
|   |                       |
|---|-----------------------|
| PHOTO NO. VA 15   | ROLL: RVC 138         |
| LOCATION: N 02° 58,240' W 75° 46,480'   | Planadas / Tolima     |
| VERIFICATION DATE: 27/02/97   | SPRAYING TIME: 5 days |
| <p><b>COMMENTS:</b></p> <ul style="list-style-type: none"> <li>• Observe plot few days after spraying.</li> <li>• See yellowish color of plants, indicating their evident death *100% control.</li> </ul> |                       |



**Annex 41-B**

**ENVIRONMENTAL AUDIT ON THE ERADICATION OF ILLICIT CROPS, REPORT ON  
ACTIVITIES, PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING  
WITH GLYPHOSATE, PERIOD 1-30 SEPTEMBER 2000, 18 OCTOBER 2000**

*(Archives of the Colombian Foreign Ministry)*



The Ministry of Justice and Law

NATIONAL NARCOTICS DIRECTORATE  
Special Administrative Unit

REPORT ON ACTIVITIES

PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL  
SPRAYING WITH GLYPHOSATE

PERIOD FROM SEPTEMBER 1 TO 30, 2000

ENVIRONMENTAL AUDIT OF ILLICIT CROP ERADICATION

Bogotá, D.C., October 18, 2000

Bogotá, D.C., October 18, 2000

GABRIEL MERCHAN BENAVIDES  
Director  
National Narcotics Directorate  
Bogotá, D.C.

Dear Mr. Merchan:

Enclosed, I am submitting the Report on Activities by the Environmental Audit in monitoring the Program for the Eradication of Illicit Crops by Aerial Spraying.

The report contains the activities carried out between September 1 - 30, 2000.

Sincerely,

*[Signed]*

JAIRO ERNESTO PEREZ R.  
Environmental Auditor For Illicit Crop Eradication



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## INTRODUCTION

This document is the report of the Environmental Audit to monitor the activities of the Program for the Eradication of Illicit Crops by Aerial Spraying, during the period between September 1 - 30, 2000.

Topics:

- Activities carried out
  - Interagency meetings
- Aerial reconnaissance and verifications
- Spraying Activities
- Performance Indicators
- Environmental impact
- Recommendations

## **2. ACTIVITIES CARRIED OUT**

### **2.1 INTERINSTITUTIONAL MEETINGS**

#### **2.1.1. Meeting of NAS, Antinarcotics Police, Environmental Auditing**

On September 5, officials from NAS, DIRAN-ARECI and Environmental Auditing met to define the schedule of activities and the necessary logistics for carrying out the Protocol for Verification of Coca Crops sprayed with Glyphosate during the period between October 1, 1999 and June 30, 2000.

#### **2.1.2. Interinstitutional Committee Meeting**

On September 6, the National Narcotics Director formally inaugurated the Interinstitutional Committee created to advise the D.N.E, pursuant to Article 8 of Resolution 005 of August 11, 2000. To this effect, officials from the Ministry of Environment, the Ministry of Health, the Attorney General's Office, the National Narcotics Directorate, the Colombian Agriculture and Livestock Institute, the Agustin Codazzi Geographical Institute, the National Institute of Health, IDEAM and Environmental Auditing participated.

The main task to be carried out by the Committee is to draft the terms of reference for contracting the Technical Audit, for follow-up on the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate.

#### **2.1.3. Meeting of Antinarcotics Police, SIMCI and Environmental Auditing**

On September 7, officials from the Area for the Eradication of Illicit Crops of DIRAN, SIMCI and Environmental Auditing met to adjust the methodology for carrying out the National Aerial Census of Illicit Crops, which is to be undertaken in October and November of this year.

#### **2.1.4. Meeting of NAS, Antinarcotics Police, Environmental Auditing**

On September 8, 2000, officials from NAS, Dyncorp, DIRAN – ARECI and Auditing met to define the size of the sample for verification, as well as to confirm participation by the entities invited to set up the Verification Commission.

#### **2.1.5. Final Meeting of Verification Protocol Commission**

On September 22, the evaluating commission and observers met to evaluate the results of the activities of the Verification Protocol, as well as to make the relevant recommendations to achieve greater efficiency in carrying out future verification activities.

#### **2.1.6. Meeting of the Ministry of the Environment, National Narcotics Directorate, SIMA Ltda. and Environmental Auditing**

On the 25th of this month, officials from the Ministry of Environment, D.N.E., SIMA Ltda. and Environmental Auditing met to analyze and resolve certain objections made by the Ministry of Environment regarding implementation of the Environmental Management Plan for handling the Glyphosate herbicide. The Ministry of Environment also urged the D.N.E. to analyze as quickly as possible, from the economic (budgetary) and safety (hazard) point of view, the application and implementation of the activities contemplated in the Environmental Management Plan.

### **2.1.7. Meeting of Interinstitutional Technical Committee**

On September 26, 2000, the Interinstitutional Technical Committee met to draft the terms of reference for contracting the Technical Audit, as stipulated in Resolution number 05 of August 11, 2000.

Officials from the Ministry of Environment, Ministry of Health, Attorney General's Office, National Institute of Health, Colombian Agriculture and Livestock Institute, National Alternative Development Plan, National Parks Unit, IDEAM, National Narcotics Directorate, DIRAN and Environmental Auditing Participated at that meeting.

## **2.2. AERIAL RECONNAISSANCE AND VERIFICATION**

### **2.2.1. Development of the Verification Protocol of Illicit Coca Crops Sprayed with Glyphosate**

Between September 12 and 21, 2000, the Verification Protocol was developed to determine the effectiveness of aerial spraying with glyphosate performed in the period from October 1, 1999 to June 30, 2000. Those activities were conducted by staff of NAS, Dyncorp, Department of Agriculture of the United States (USDA- ARS), CNC, BTG, the Colombian Agriculture and Livestock Institute, National Parks, Plante, DIRAN – ARECI and Environmental Audit.

The verification activities were developed in the Nuclei of illicit coca crops located in the provinces of Putumayo, Caqueta, Cauca, Guaviare, Meta and Norte de Santander, identifying the following percentages of effectiveness:

#### **Caquetá, Putumayo, and Cauca Nucleus**

The effectiveness of the Program for the Eradication of Illicit Crops by Aerial Spraying for this region and based on the field assessments was determined at 91.63%.

#### **Guaviare Meta Nucleus**

For this region an efficiency of 91.97% was defined.

#### **Norte de Santander Nucleus (La Gabarra)**

The effectiveness in this nucleus was identified at 90.26%.

The effectiveness of the Program for the Eradication of Illicit Crops nationwide was calculated based on weighted averages of the analyzed Nuclei, determining an average of 91.28%.

### 3. AERIAL SPRAYING ACTIVITIES

#### 3.1. Summary charts

In order to illustrate the activities of the Illicit Crops Eradication Program, a summary of this work is presented in the following charts:

| <b>SUMMARY OF AERIAL SPRAYING ACTIVITIES OF ILLICIT COCA CROPS</b> |  |
|--|--|
| Regions where the eradication program was carried out:             |  |
| • Departments:   | Caquetá, Putumayo, Nariño, Boyacá, Santander and Cundinamarca  |
| • Municipalities:  | Cartagena del Chaira, Curillo, Solano, Solita, Valparaiso, Puerto Guzmán, Puerto Leguizamo, Puerto Asis, San José, Payán, Tumaco, Barbacoas, Otanche, Pauna, San Pablo de Borbur, Tunungua, Bolívar, La Belleza, El Peñón, Sucre and Yacopí. |
| Aircraft that participated:  | PNC 241, 243, 244, 264, 265, 274, 275, 277.  |
| Agrochemicals used:  | Glyphosate + (Cosmoflux)   |
| Applied dose:  | 10.4 l/ha + (1 l/ha)   |
| Volume of discharge:   | 23.46 l/ha (6.25 gal/ha)   |
| Total area sprayed:  | 4717.6 ha  |
| Total days of activity:  | 17 days  |
| Period:  | September 1-30, 2000   |

Similarly, in CHARTS No. 3.1 and in Maps Nos. 3.1, 3.2, 3.3 and 3.4, the areas where illicit coca crops were sprayed are presented in detail.

CHART number 3.2 shows the meteorological conditions for spraying of illicit coca crops.

#### **CHART SUMMARIZING AERIAL SPRAYING OF ILLICIT POPPY CROPS BY DEPARTMENT AND MUNICIPALITY FOR THE MONTH OF SEPTEMBER, 2000<sup>(1)</sup>**

| DEPARTMENT                       | MUNICIPALITY | Area (ha)  |
|----------------------------------|--------------|------------|
| -                                | -            | 0.0        |
| <b>Total for September, 2000</b> |              | <b>0.0</b> |

(1) Data from September 1-30, 2000.

**CHART SUMMARIZING AERIAL SPRAYING OF ILLICIT POPPY CROPS BY  
DEPARTMENT AND MUNICIPALITY FOR THE MONTH OF SEPTEMBER, 2000<sup>(2)</sup>**

| <b>DEPARTMENT</b>                | <b>MUNICIPALITY</b> | <b>AREA (ha)</b> |
|----------------------------------|---------------------|------------------|
| <b>PUTUMAYO</b>                  | Puerto Guzmán       | 185.10           |
|                                  | Puerto Leguizamo    | 47.50            |
|                                  | Puerto Asis         | 12.00            |
| <b>CAQUETA</b>                   | Cartagena Del       | 45.10            |
|                                  | Chairá              | 58.00            |
|                                  | Solano              | 78.00            |
|                                  | Solita              | 106.30           |
|                                  | Valparaiso          | 8.00             |
| <b>NARIÑO</b>                    | San Jose            | 620.40           |
|                                  | Payan               | 221.80           |
|                                  | Tumaco              | 2540.90          |
|                                  | Barbacoas           | 222.00           |
| <b>BOYACA</b>                    | Otanche             | 45.90            |
|                                  | Pauna               | 80.60            |
|                                  | San Pablo de        | 51.60            |
|                                  | Borbur              | 43.10            |
|                                  | Tunungua            |                  |
| <b>SANTANDER</b>                 | Bolívar             | 23.10            |
|                                  | La Belleza          | 134.90           |
|                                  | El Peñon            | 92.20            |
|                                  | Sucre               | 56.30            |
| <b>CUNDINAMARCA</b>              | Yacopi              | 44.30            |
| <b>TOTAL FOR SEPTEMBER, 2000</b> |                     | <b>4.717.60</b>  |

(2) Data between September 1-30, 2000

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE     | ACTIVITY         | MUNICIPALITY | INSPECTION/<br>DISTRICT  | AREA<br>(ha) | COORDENATES  |  | AIRCRAFT<br>PNC NO. | WATER BASIN   | COMMENTS                  |               |
|----------|------------------|--------------|--------------------------|--------------|--|--|---------------------|---------------|---------------------------|---------------|
|          |                  |              |                          |              | NORTH (N)  | WEST (W)   |                     |               |                           |               |
| 8/09/00  | Aerial aspersion | Barbacoas    | Chapira                  | 172.00       | 01°43.5154<br>01°43.1389<br>01°42.0291<br>01°41.8310<br>01°41.5535<br>01°41.4941<br>01°41.2563<br>01°41.0977   | 78°14.8662<br>78°12.8637<br>78°10.0087<br>78°11.3371<br>78°11.9914<br>78°09.1959<br>78°09.4933<br>78°09.1165   |                     | Telembí river |                           |               |
| 9/09/00  | No<br>aspersion  | -            | -                        | -            | -  | -  | -                   | -             | Bad weather<br>conditions |               |
| 10/09/00 | Aerial aspersion | San José     | San Antonio              | 176.80       | 01°49.0869<br>01°48.8435<br>01°48.0526<br>01°46.1665<br>01°45.5581<br>01°45.3147<br>01°44.7672<br>01°41.9076<br>01°41.2384<br>01°39.2306               | 78°17.1376<br>78°16.2246<br>78°19.9984<br>78°19.2071<br>78°18.1119<br>78°18.9636<br>78°19.1463<br>78°17.0159<br>78°16.1637<br>78°16.5898               | 264<br>265<br>275   | Tembí river   |                           |               |
|          |                  |              | Palo Seco                |              |  |  |                     |               |                           | Ispí river    |
|          |                  |              | Iguambi                  |              |  |  |                     |               |                           | Gualpí C      |
| 11/09/00 | Aerial aspersion | San José     | Palo Seco<br>San Antonio | 61.00        | 01°45.2571<br>01°49.5665<br>01°47.6077<br>01°45.5929<br>01°42.1230<br>01°43.6340<br>01°43.6900<br>01°41.2275<br>01°40.7238<br>01°41.2275<br>01°41.1156 | 78°24.7356<br>78°22.1600<br>78°21.0402<br>78°18.1846<br>78°18.6325<br>78°15.1611<br>78°16.2249<br>78°16.2809<br>78°18.4765<br>78°16.2809<br>78°15.2731 | 264                 | Pirí river    |                           |               |
|          |                  |              |                          |              |  |  |                     |               |                           | Gualpí river  |
|          |                  |              |                          |              |  |  |                     |               |                           | Telembí river |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE       | ACTIVITY         | MUNICIPALITY | INSPECTION / DISTRICT | AREA (ha) | COORDENATES |            | AIRCRAFT PNC NO.  | WATER BASIN                  | COMMENTS |
|------------|------------------|--------------|-----------------------|-----------|-------------|------------|-------------------|------------------------------|----------|
|            |                  |              |                       |           | NORTH (N)   | WEST (W)   |                   |                              |          |
| 11/09/00   | Aerial aspersion | Barbacoas    | Chapira               | 50.00     | 01°41.2275  | 78°12.9774 |                   | Telembi river                |          |
|            |                  |              |                       |           | 01°40.2761  | 78°14.3772 |                   |                              |          |
|            |                  |              |                       |           | 01°42.6267  | 78°12.7535 |                   |                              |          |
|            |                  |              |                       |           | 01°42.1230  | 78°10.0659 |                   |                              |          |
|            |                  |              |                       |           | 01°45.5369  | 78°11.5776 |                   |                              |          |
|            |                  |              |                       |           | 01°46.4324  | 78°12.3055 |                   |                              |          |
| 12/09/00   | Aerial aspersion | Payán        | Payán                 | 51.20     | 01°47.8875  | 78°11.6896 |                   | Telembi river                |          |
|            |                  |              |                       |           | 01°49.7344  | 78°11.4657 |                   |                              |          |
|            |                  |              |                       |           | 01°47.4398  | 78°13.4813 |                   |                              |          |
|            |                  |              |                       |           | 01°43.7220  | 78°28.3834 |                   |                              |          |
|            |                  |              |                       |           | 01°42.9823  | 78°27.6015 |                   |                              |          |
|            |                  |              |                       |           | 01°42.2566  | 78°27.4898 |                   |                              |          |
| 13/09/00   | Aerial aspersion | Tumaco       | Las Sirenas           | 99.00     | 01°41.3216  | 78°27.4339 | 264<br>275<br>277 | Changul river<br>Pilbi river |          |
|            |                  |              |                       |           | 01°40.4284  | 78°27.7551 |                   |                              |          |
|            |                  |              |                       |           | 01°44.4058  | 78°28.0064 |                   |                              |          |
|            |                  |              |                       |           | 01°22.2239  | 78°30.7569 |                   |                              |          |
|            |                  |              |                       |           | 01°21.9018  | 78°30.4824 |                   |                              |          |
|            |                  |              |                       |           | 01°21.4843  | 78°31.3535 |                   |                              |          |
| 13/09/00   | Aerial aspersion | Tumaco       | Bocas de Pilbi        | 217.30    | 01°21.4604  | 78°30.7211 | 264<br>275        | Mira river                   |          |
|            |                  |              |                       |           | 01°21.1742  | 78°30.8881 |                   |                              |          |
|            |                  |              |                       |           | 01°20.9714  | 78°31.1506 |                   |                              |          |
|            |                  |              |                       |           | 01°20.5062  | 78°31.4967 |                   |                              |          |
|            |                  |              |                       |           | 01°20.4465  | 78°31.1864 |                   |                              |          |
|            |                  |              |                       |           | 01°20.1732  | 78°31.2461 |                   |                              |          |
|            |                  |              |                       |           | 01°20.0290  | 78°31.8069 |                   |                              |          |
|            |                  |              |                       |           | 01°19.5757  | 78°31.4012 |                   |                              |          |
|            |                  |              |                       |           | 01°19.3133  | 78°31.5563 |                   |                              |          |
|            |                  |              |                       |           | 01°18.6214  | 78°32.0336 |                   |                              |          |
|            |                  |              |                       |           | 01°18.3352  | 78°31.8904 |                   |                              |          |
|            |                  |              |                       |           | 01°17.7777  | 78°32.6346 |                   |                              |          |
| 01°17.5563 | 78°32.1578       |              |                       |           |             |            |                   |                              |          |
| 01°16.9728 | 78°32.7935       |              |                       |           |             |            |                   |                              |          |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE     | ACTIVITY            | MUNICIPALITY | INSPECTION / DISTRICT | AREA (ha) | COORDENATES  |  | AIRCRAFT PNC NO.                | WATER BASIN                                     | COMMENTS               |
|----------|---------------------|--------------|-----------------------|-----------|--|--|---------------------------------|---|------------------------|
|          |                     |              |                       |           | NORTH (N)  | WEST (W)   |                                 |   |                        |
| 11/09/00 | Aerial aspersion    | Tumaco       | La Honda              | 427.30    | 01°22.2591<br>01°22.1337<br>01°21.7627<br>01°21.6948<br>01°21.4493<br>01°21.0678<br>01°20.8588<br>01°21.7035<br>01°21.6541<br>01°21.5284<br>01°21.2995<br>01°21.1514<br>01°20.7789<br>01°19.8130<br>01°19.5559<br>01°19.0821<br>01°19.3325<br>01°19.6642<br>01°18.6152 | 78°34.0912<br>78°33.8560<br>78°34.2636<br>78°33.9866<br>78°33.3856<br>78°34.1905<br>78°33.1557<br>78°33.2506<br>78°32.4738<br>78°32.3706<br>78°33.4526<br>78°32.6714<br>78°32.6714<br>78°34.9938<br>78°34.8855<br>78°34.7839<br>78°34.3913<br>78°33.4030<br>78°33.7821 | 265<br>374                      | Mira river                                      |                        |
| 2/09/00  | No aerial aspersion | -            | -                     | -         | -  | -  | -                               | -   | Bad weather conditions |
| 3/09/00  | No aerial aspersion | -            | -                     | -         | -  | -  | -                               | -   | Bad weather conditions |
| 4/09/00  | Aerial aspersion    | San Jose     | San Antonio           | 31.90     | 01°48.3062<br>01°47.6699<br>01°47.2129<br>01°46.3079<br>01°43.1334<br>01°42.9347<br>01°42.2938   | 78°26.6540<br>78°26.3940<br>78°26.9230<br>78°26.9050<br>78°27.9265<br>78°27.4478<br>78°27.3937   | 264<br>265<br>274<br>275<br>277 | La Caonera C.<br>La Caonera C.<br>Changuí river |                        |



TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE       | ACTIVITY         | MUNICIPALITY | INSPECTION / DISTRICT | AREA (ha) | COORDENATES |            | AIRCRAFT PNC NO. | WATER BASIN   | COMMENTS |
|------------|------------------|--------------|-----------------------|-----------|-------------|------------|------------------|---------------|----------|
|            |                  |              |                       |           | NORTH (N)   | WEST (W)   |                  |               |          |
| 4/09/00    | Aerial aspersion | Tumaco       | Bocas de Pilibi       |           | 01°41.6257  | 78°27.8382 | 265<br>374       | Mira river    |          |
|            |                  |              |                       |           | 01°41.4813  | 78°27.5472 |                  |               |          |
|            |                  |              |                       |           | 01°41.3549  | 78°27.0775 |                  |               |          |
|            |                  |              |                       |           | 01°41.2741  | 78°27.4713 |                  |               |          |
|            |                  |              |                       |           | 01°41.2613  | 78°27.0383 |                  |               |          |
|            |                  |              |                       |           | 01°40.8904  | 78°27.0255 |                  |               |          |
|            |                  |              |                       |           | 01°40.4594  | 78°27.5477 |                  |               |          |
|            |                  |              |                       |           | 01°40.3766  | 78°27.070  |                  |               |          |
|            |                  |              |                       |           | 01°40.2302  | 78°27.3630 |                  |               |          |
|            |                  |              |                       |           | 01°39.9629  | 78°27.0828 |                  |               |          |
|            |                  |              |                       |           | 01°39.7665  | 78°26.8124 |                  |               |          |
|            |                  |              |                       |           | 01°39.4664  | 78°27.8979 |                  |               |          |
|            |                  |              |                       |           | 01°39.5365  | 78°26.5607 |                  |               |          |
|            |                  |              |                       |           | 01°38.7918  | 78°26.9364 |                  |               |          |
|            |                  |              |                       |           | 01°38.2640  | 78°27.9174 |                  |               |          |
|            |                  |              |                       |           | 01°37.4730  | 78°28.0178 |                  |               |          |
| 01°37.5107 | 78°26.9627       |              |                       |           |             |            |                  |               |          |
| 01°36.9582 | 78°27.5154       |              |                       |           |             |            |                  |               |          |
| 01°36.6694 | 78°26.4729       |              |                       |           |             |            |                  |               |          |
| 01°36.9959 | 78°25.7695       |              |                       |           |             |            |                  |               |          |
| 01°36.6318 | 78°26.4980       |              |                       |           |             |            |                  |               |          |
| 01°35.9287 | 78°26.8497       |              |                       |           |             |            |                  |               |          |
| 01°35.4013 | 78°26.0584       |              |                       |           |             |            |                  |               |          |
| 01°34.9242 | 78°26.4603       |              |                       |           |             |            |                  |               |          |
| 01°34.9242 | 78°25.5183       |              |                       |           |             |            |                  |               |          |
| 01°34.6605 | 78°26.4980       |              |                       |           |             |            |                  |               |          |
| 5/09/00    | Aerial aspersion | Tumaco       | Las Sirenas           | 353.60    | 01°44.9245  | 78°28.9897 | 265              | Changuí river |          |
|            |                  |              |                       |           | 01°44.8228  | 78°28.2306 |                  |               |          |

TABLE No. 3.1  
 AERIAL ASPERSION OF COCA ILLICIT CROPS  
 DEPARTMENT OF NARIÑO

| DATE       | ACTIVITY         | MUNICIPALITY | INSPECTION /<br>DISTRICT | AREA<br>(ha) | COORDENATES |            | AIRCRAFT<br>PNC NO. | WATER BASIN   | COMMENTS |     |  |
|------------|------------------|--------------|--------------------------|--------------|-------------|------------|---------------------|---------------|----------|-----|--|
|            |                  |              |                          |              | NORTH (N)   | WEST (W)   |                     |               |          |     |  |
| 5/09/00    | Aerial aspersion | Tumaco       | Las Sirenas              |              | 01°44.2675  | 78°28.1054 | 275                 | Changuí river |          |     |  |
|            |                  |              |                          |              | 01°43.8764  | 78°29.4201 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°43.7590  | 78°28.3793 |                     |               |          | 277 |  |
|            |                  |              |                          |              | 01°43.5948  | 78°28.2071 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°43.0473  | 78°28.5436 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°42.8439  | 78°28.0976 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°42.2985  | 78°29.3688 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°42.1312  | 78°28.5693 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°42.0321  | 78°28.8916 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°41.8525  | 78°29.2076 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°41.6542  | 78°29.0155 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°41.4932  | 78°29.2882 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°45.2516  | 78°28.8482 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°45.1525  | 78°28.5383 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°41.0472  | 78°28.1974 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°40.8861  | 78°29.1457 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°40.6321  | 78°28.5197 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°40.4710  | 78°28.3214 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°40.3100  | 78°29.9288 |                     |               |          |     |  |
|            |                  |              |                          |              | 01°40.2480  | 78°28.2470 |                     |               |          |     |  |
| 01°39.3852 | 78°28.3512       |              |                          |              |             |            |                     |               |          |     |  |
| 01°38.4545 | 78°28.9719       |              |                          |              |             |            |                     |               |          |     |  |
| 01°38.5516 | 78°28.0660       |              |                          |              |             |            |                     |               |          |     |  |
| 01°38.3203 | 78°28.2840       |              |                          |              |             |            |                     |               |          |     |  |
| 01°38.1694 | 78°28.0660       |              |                          |              |             |            |                     |               |          |     |  |
| 01°37.9514 | 78°28.2002       |              |                          |              |             |            |                     |               |          |     |  |
| 01°37.6663 | 78°28.0492       |              |                          |              |             |            |                     |               |          |     |  |
| 01°37.5070 | 78°28.2924       |              |                          |              |             |            |                     |               |          |     |  |
| 01°37.5573 | 78°28.0660       |              |                          |              |             |            |                     |               |          |     |  |
|            |                  |              | Las Sirenas              |              |             |            |                     | Changuí river |          |     |  |
|            |                  |              | Bocas del Pilbi          |              |             |            |                     | Pilbi river   |          |     |  |
|            |                  |              | Bocas del Pilbi          |              |             |            |                     | Pelay river   |          |     |  |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE     | ACTIVITY            | MUNICIPALITY | INSPECTION / DISTRICT | AREA (ha) | COORDENATES  |  | AIRCRAFT PNC NO.         | WATER BASIN   | COMMENTS                            |
|----------|---------------------|--------------|-----------------------|-----------|--|--|--------------------------|---|-------------------------------------|
|          |                     |              |                       |           | NORTH (N)  | WEST (W)   |                          |   |                                     |
| 06/09/00 | Aerial aspersion    | Tumaco       | La Maria              | 215.50    | 01°21.5893<br>01°20.8794<br>01°21.1160<br>01°20.3115<br>01°19.5543<br>01°19.2702<br>01°19.1757<br>01°18.7734<br>01°17.9925   | 78°32.1137<br>78°32.4925<br>78°31.9481<br>78°32.4925<br>78°32.8002<br>78°32.7055<br>78°32.1079<br>78°32.8712<br>78°33.1552   | 264<br>265<br>277        | Mira river  |                                     |
| 7/09/00  | No aerial aspersion | -            | -                     | -         | -  | -  | -                        | -   | Aircraft in interdiction activities |
| 8/09/00  | Aerial aspersion    | San José     | San Antonio           | 7.50      | 01°51.1114<br>01°50.8156<br>01°50.3931<br>01°50.3931<br>01°44.9027<br>01°43.8920<br>01°53.7618<br>01°52.2539<br>01°52.4370<br>01°51.9070<br>01°51.4213<br>01°51.1122<br>01°50.7810<br>01°50.1848<br>01°49.7432<br>01°48.9263<br>01°48.0431 | 78°22.9389<br>78°22.7698<br>78°22.9389<br>78°22.9178<br>78°15.5507<br>78°15.2033<br>78°11.5848<br>78°11.4523<br>78°11.4523<br>78°10.9000<br>78°11.2756<br>78°11.6069<br>78°11.2977<br>78°11.6953<br>78°11.4081<br>78°11.8279<br>78°11.9383 | 264<br>265<br>275<br>277 | Patia river<br><br>Telembi river<br>Isbi river<br>Patia river |                                     |
|          |                     |              |                       |           |  |  |                          | Guafambi C.   |                                     |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE       | ACTIVITY         | MUNICIPALITY | INSPECTION /<br>DISTRICT | AREA<br>(ha) | COORDENATES |            | AIRCRAFT<br>PNC NO. | WATER BASIN  | COMMENTS |
|------------|------------------|--------------|--------------------------|--------------|-------------|------------|---------------------|--------------|----------|
|            |                  |              |                          |              | NORTH (N)   | WEST (W)   |                     |              |          |
| 13/09/00   | Aerial aspersion | Tumaco       | La Maria                 |              | 01°16.8139  | 78°32.4015 |                     | Mira river   |          |
|            |                  |              |                          |              | 01°16.3903  | 78°32.6769 |                     |              |          |
|            |                  |              |                          |              | 01°16.2526  | 78°32.0371 |                     |              |          |
|            |                  |              |                          |              | 01°15.8925  | 78°33.2596 |                     |              |          |
|            |                  |              |                          |              | 01°15.2146  | 78°33.3126 |                     |              |          |
| 14/09/00   | Aerial aspersion | Tumaco       | La Balsa                 | 338.9        | 01°23.6336  | 78°37.0924 | 264<br>274<br>275   | Mataje river |          |
|            |                  |              |                          |              | 01°23.2657  | 78°37.7107 |                     |              |          |
|            |                  |              |                          |              | 01°23.0204  | 78°38.0493 |                     |              |          |
|            |                  |              |                          |              | 01°23.0449  | 78°37.7205 |                     |              |          |
|            |                  |              |                          |              | 01°23.2853  | 78°37.2004 |                     |              |          |
|            |                  |              |                          |              | 01°23.0645  | 78°37.4801 |                     |              |          |
|            |                  |              |                          |              | 01°22.8585  | 78°37.7401 |                     |              |          |
|            |                  |              |                          |              | 01°22.2650  | 78°38.6528 |                     |              |          |
|            |                  |              |                          |              | 01°22.1276  | 78°38.5497 |                     |              |          |
|            |                  |              |                          |              | 01°22.6966  | 78°37.7303 |                     |              |          |
|            |                  |              |                          |              | 01°22.2257  | 78°37.3378 |                     |              |          |
|            |                  |              |                          |              | 01°21.5385  | 78°39.5035 |                     |              |          |
|            |                  |              |                          |              | 01°21.0364  | 78°40.0457 |                     |              |          |
|            |                  |              |                          |              | 01°20.9018  | 78°40.1985 |                     |              |          |
|            |                  |              |                          |              | 01°20.8327  | 78°40.0930 |                     |              |          |
|            |                  |              |                          |              | 01°21.0110  | 78°39.8856 |                     |              |          |
|            |                  |              |                          |              | 01°21.3457  | 78°39.4562 |                     |              |          |
|            |                  |              |                          |              | 01°20.7709  | 78°40.0057 |                     |              |          |
|            |                  |              |                          |              | 01°20.9964  | 78°39.7400 |                     |              |          |
|            |                  |              |                          |              | 01°21.2766  | 78°39.4343 |                     |              |          |
| 01°22.2387 | 78°37.3302       |              |                          |              |             |            |                     |              |          |
| 01°22.1706 | 78°36.2306       |              |                          |              |             |            |                     |              |          |
| 01°21.5334 | 78°36.9069       |              |                          |              |             |            |                     |              |          |
| 01°21.1102 | 78°37.4227       |              |                          |              |             |            |                     |              |          |
| 01°21.2755 | 78°37.1210       |              |                          |              |             |            |                     |              |          |
| 01°21.5090 | 78°36.7366       |              |                          |              |             |            |                     |              |          |
| 01°21.9890 | 78°36.1965       |              |                          |              |             |            |                     |              |          |
|            |                  |              | La Balsa                 |              |             |            |                     | Mataje river |          |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE       | ACTIVITY         | MUNICIPALITY | INSPECTION / DISTRICT | AREA (ha) | COORDENATES |            | AIRCRAFT PNC NO. | WATER BASIN    | COMMENTS |     |              |
|------------|------------------|--------------|-----------------------|-----------|-------------|------------|------------------|----------------|----------|-----|--------------|
|            |                  |              |                       |           | NORTH (N)   | WEST (W)   |                  |                |          |     |              |
| 14/09/00   | Aerial aspersion | Tumaco       | La Balsa              |           | 01°21.3485  | 78°36.6393 |                  | Matateje river |          |     |              |
|            |                  |              |                       |           | 01°21.8933  | 78°36.0406 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°22.5208  | 78°35.4034 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.8836  | 78°35.7878 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°22.2776  | 78°35.4478 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°22.4965  | 78°35.2233 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°22.4284  | 78°35.2039 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.2512  | 78°36.1624 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.1588  | 78°35.4520 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.0956  | 78°35.3742 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°20.1985  | 78°38.5937 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°19.6992  | 78°38.3883 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°18.9106  | 78°38.9628 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.1489  | 78°35.4148 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°20.0071  | 78°34.9270 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°19.7789  | 78°34.9879 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°21.0111  | 78°34.1674 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°20.2177  | 78°34.5444 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°20.3285  | 78°33.9789 |                  |                |          |     |              |
| 01°20.6722 | 78°33.2249       |              |                       |           |             |            |                  |                |          |     |              |
| 01°19.3138 | 78°35.2085       |              |                       |           |             |            |                  |                |          |     |              |
| 01°19.0370 | 78°35.1994       |              |                       |           |             |            |                  |                |          |     |              |
| 01°18.9826 | 78°35.3310       |              |                       |           |             |            |                  |                |          |     |              |
| 01°18.4698 | 78°35.5806       |              |                       |           |             |            |                  |                |          |     |              |
| 01°18.3519 | 78°35.4808       |              |                       |           |             |            |                  |                |          |     |              |
| 15/09/00   | Aerial aspersion | San José     | Palo Seco             | 343.20    | 01°45.1748  | 78°19.0165 | 265              | Pitri river    |          |     |              |
|            |                  |              |                       |           | 01°45.6687  | 78°18.1024 |                  |                |          | 274 | Pattia river |
|            |                  |              |                       |           | 01°43.5944  | 78°16.0766 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°42.5819  | 78°12.7167 |                  |                |          |     |              |
|            |                  |              |                       |           | 01°41.3225  | 78°16.1754 |                  |                |          |     |              |
| 01°40.1372 | 78°14.4955       |              |                       |           |             |            |                  |                |          |     |              |
|            |                  |              | San José              |           |             |            |                  |                |          |     |              |
|            |                  |              |                       |           |             |            |                  |                |          |     |              |
|            |                  |              |                       |           |             |            |                  |                |          |     |              |
|            |                  |              |                       |           |             |            |                  |                |          |     |              |
|            |                  |              |                       |           |             |            |                  |                |          |     |              |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF NARIÑO

| DATE     | ACTIVITY            | MUNICIPALITY | INSPECTION/<br>DISTRICT | AREA<br>(ha) | COORDENATES  |  | AIRCRAFT<br>PNC NO. | WATER BASIN                 | COMMENTS                           |
|----------|---------------------|--------------|-------------------------|--------------|--|--|---------------------|-----------------------------|------------------------------------|
|          |                     |              |                         |              | NORTH (N)  | WEST (W)   |                     |                             |                                    |
| 15/09/00 | Aerial aspersion    | San José     | San José                |              | 01°39.3223<br>01°38.8284<br>01°42.3704<br>01°22.9843<br>01°22.6411<br>01°22.2083 | 78°16.7436<br>78°17.1636<br>78°15.5395<br>78°37.8707<br>78°37.7662<br>78°37.2736 |                     | Gualpi C.<br><br>Mira river |                                    |
| 16/09/00 | No aerial aspersion | -            | -                       | -            | -  | -  | -                   | -                           | Suspension of activities           |
| 17/09/00 | No aerial aspersion | -            | -                       | -            | -  | -  | -                   | -                           | Transfer of equipment to Mariquita |
| 18/09/00 | No aerial aspersion | -            | -                       | -            | -  | -  | -                   | -                           | Transfer of equipment to Mariquita |
| 19/09/00 | No aerial aspersion | -            | -                       | -            | -  | -  | -                   | -                           | Transfer of equipment to Mariquita |

TABLE No. 3.1  
 AERIAL ASPERSION OF COCA ILLICIT CROPS  
 DEPARTMENT OF BOYACA AND SANTANDER

| DATE     | ACTIVITY            | MUNICIPALITY | INSPECTION / DISTRICT      | AREA (ha) | COORDINATES  |  | AIRCRAFT PNC NO. | WATER BASIN                            | COMMENTS               |
|----------|---------------------|--------------|----------------------------|-----------|--|--|------------------|--|------------------------|
|          |                     |              |                            |           | NORTH (N)  | WEST (W)   |                  |  |                        |
| 20/09/00 | No aerial aspersión | -            | -                          | -         | -  | -  | -                | -                                      | Bad weather conditions |
| 21/09/00 | Aerial aspersión    | Bolívar      | Berneo                     | 20.60     | 06°08.4374<br>06°08.1227<br>06°07.7659   | 73°52.8444<br>73°53.4143<br>73°53.6464   | 274<br>275       | Hoyo or Panama C.<br>Hoyo or Panama C. |                        |
|          |                     | El Peñon     | El Peñon                   | 57.50     | 06°07.4721<br>06°06.5488<br>06°06.1290<br>06°05.6464<br>06°04.5971   | 73°54.0263<br>73°55.1237<br>73°55.8835<br>73°55.3981<br>73°58.0362   |                  |  |                        |
|          |                     | Sucre        | La Granja                  | 19.00     | 06°04.1774<br>06°03.5688<br>06°03.2541   | 73°57.6352<br>73°58.0784<br>73°58.5427   |                  | Dorada river<br>Chatama C.             |                        |
|          |                     | Pauna        | Otro Mundo                 | 50.00     | 05°44.2036<br>05°43.3292<br>05°43.1401<br>05°42.4311<br>05°44.9126   | 74°00.1112<br>73°58.3773<br>74°00.5387<br>73°59.0424<br>73°57.7360<br>73°58.5673   |                  | Piedras river                          |                        |
| 22/09/00 | Aerial aspersión    | La Belleza   | La Belleza                 | 32.20     | 05°54.5830<br>05°54.2187<br>05°53.5247<br>05°52.5878<br>05°52.4837<br>05°52.2321<br>05°52.1888<br>05°51.6683<br>05°51.3310<br>05°50.0615<br>05°45.3417<br>05°45.2573 | 74°06.7319<br>74°05.8773<br>74°07.0720<br>74°05.5197<br>74°05.8773<br>74°06.2087<br>74°05.7988<br>74°05.6069<br>74°07.7598<br>74°08.4872<br>74°12.7329<br>74°13.0329 | 274<br>275       | Tipa C.                                |                        |
|          |                     | Ofanche      | Betania (IP)<br>Los Bancos | 31.50     |  |  |                  | El Cobre C.<br>Tambrias C.             |                        |

TABLE No. 3.1  
 AERIAL ASPERSION OF COCA ILLICIT CROPS  
 DEPARTMENT OF BOYACA AND SANTANDER

| DATE     | ACTIVITY            | MUNICIPALITY        | INSPECTION /<br>DISTRICT | AREA<br>(ha)  | COORDENATES  |  | AIRCRAFT<br>PNC NO. | WATER BASIN                        | COMMENTS                                  |
|----------|---------------------|---------------------|--------------------------|---------------|--|--|---------------------|------------------------------------|---|
|          |                     |                     |                          |               | NORTH (N)  | WEST (W)   |                     |                                    |   |
| 22/09/00 | Aerial aspersion    | Pauna               | Otro Mundo               | 30.60         | 05°47.2235<br>05°46.8171<br>05°46.6380<br>05°46.4589<br>05°46.2799<br>05°46.1766<br>05°45.9630<br>05°45.7289   | 74°04.9502<br>74°06.1925<br>74°04.2372<br>74°04.1472<br>74°05.3310<br>74°04.3618<br>74°05.6425<br>74°05.3725   | 274<br>275          | Ibacapi river                      |   |
| 23/09/00 | Aerial aspersion    | Boilvar<br>El Peñon | Berneio<br>El Peñon      | 3.00<br>35.20 | 06°09.2962<br>06°08.8948<br>06°07.6131<br>06°07.2734<br>06°06.5940<br>06°04.1462<br>06°05.3587<br>06°04.1852<br>06°02.6232<br>05°59.8505<br>05°59.4777<br>05°58.5690<br>05°58.2661<br>05°57.3574<br>05°56.5090<br>05°57.6603<br>05°57.1244<br>05°55.7265<br>05°55.3537<br>05°51.4837<br>05°51.1899<br>05°50.8472 | 73°58.1410<br>73°58.0944<br>73°57.8149<br>73°58.8864<br>73°59.3368<br>73°59.3678<br>73°57.6441<br>73°57.5819<br>74°01.1581<br>74°02.3530<br>74°04.0398<br>74°02.5404<br>74°04.0866<br>74°05.1174<br>74°05.7734<br>74°02.5638<br>74°03.3604<br>74°03.8758<br>74°05.5391<br>74°12.4660<br>74°11.3956<br>74°11.6417 | 274<br>277<br>264   | Pescadero river<br>Pescadero river |   |
|          |                     | Sucre               | La Granja                | 37.30         |  |  |                     | Dorada river                       |   |
|          |                     | La Belleza          | La Belleza               | 96.20         |  |  |                     | Tipa C.<br>Quitay C.               |   |
|          |                     | Otache              | Betania (IP)             | 14.40         |  |  |                     | El Cobre C.                        |   |
| 24/09/00 | No aerial aspersion | -                   | -                        | -             |  |  |                     | -                                  | Aircraft in<br>interdiction<br>activities |



TABLE No. 3.1  
 AERIAL ASPERSION OF COCA ILLICIT CROPS  
 DEPARTMENT OF BOYACA AND SANTANDER

| DATE     | ACTIVITY            | MUNICIPALITY                      | INSPECTION / DISTRICT       | AREA (ha)     | COORDENATES  |  | AIRCRAFT PNC NO. | WATER BASIN   | COMMENTS                              |
|----------|---------------------|-----------------------------------|-----------------------------|---------------|--|--|------------------|---|---------------------------------------|
|          |                     |                                   |                             |               | NORTH (N)  | WEST (W)   |                  |   |                                       |
| 25/09/00 | No aerial aspersión | -                                 | -                           | -             | -  | -  | -                | -   | Bad weather conditions                |
| 26/09/00 | No aerial aspersión | -                                 | -                           | -             | -  | -  | -                | -   | Bad weather conditions                |
| 27/09/00 | Aerial aspersión    | Yacopi                            | Patavacá                    | 44.3          | 05°45.1619<br>05°44.3439<br>05°43.8034<br>05°43.3798<br>05°43.2192<br>05°42.0652<br>05°39.5048<br>05°38.1275<br>05°37.6357<br>05°37.7341<br>05°37.2422 | 74°20.5183<br>74°21.3551<br>74°19.7697<br>74°21.5019<br>74°18.4925<br>74°21.2523<br>74°22.7425<br>74°23.7969<br>74°23.9946<br>74°23.1544<br>74°26.8448 | 275<br>277       | Chuaqui river<br><br>Caceres river<br><br>Chirche river |                                       |
| 28/09/00 | Aerial aspersión    | La Belleza<br>San Pablo de Borbur | La Belleza<br>Peñas Blancas | 6.50<br>51.60 | 05°52.4939<br>05°44.8157<br>05°44.6387<br>05°44.5326<br>05°44.0018<br>05°43.2941<br>05°42.8342   | 74°05.8435<br>74°10.5736<br>74°09.6845<br>74°05.8079<br>74°05.4167<br>74°10.0046<br>74°09.1154   | 277<br>264       | Quitay C.<br>Tambrinas C.                               |                                       |
| 29/09/00 | No aerial aspersión | -                                 | -                           | -             | -  | -  | -                | -   | Suspension of activities              |
| 30/09/00 | No aerial aspersión | -                                 | -                           | -             | -  | -  | -                | -   | Transfer of Mobile equipment to Neiva |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF CAQUETA AND PUTUMAYO

| DATE       | ACTIVITY            | MUNICIPALITY         | INSPECTION / DISTRICT | AREA (ha)      | COORDENATES |            | AIRCRAFT PNC NO. | WATER BASIN                                     | COMMENTS |
|------------|---------------------|----------------------|-----------------------|----------------|-------------|------------|------------------|---|----------|
|            |                     |                      |                       |                | NORTH (N)   | WEST (W)   |                  |   |          |
| 1/09/00    | No aerial aspersion | -                    | -                     | -              | -           | -          | -                | -   | No Pilot |
| 2/09/00    | No aerial aspersion | -                    | -                     | -              | -           | -          | -                | -   | No Pilot |
| 3/09/00    | No aerial aspersion | -                    | -                     | -              | -           | -          | -                | -   | No Pilot |
| 4/09/00    | No aerial aspersion | -                    | -                     | -              | -           | -          | -                | -   | No Pilot |
| 5/09/00    | Aerial aspersion    | Cartagena del Chaira | El Billar             | 45.10          | 00°57.5762  | 74°43.7426 | 241              | Caguan river<br>Cristales C.                    |          |
|            |                     |                      |                       |                | 00°57.0661  | 74°42.4712 | 244              |   |          |
|            |                     |                      |                       |                | 00°55.7235  | 74°58.8881 |                  |   |          |
|            |                     |                      |                       |                | 00°53.7766  | 74°51.2364 |                  |   |          |
|            |                     |                      |                       |                | 00°52.2079  | 74°44.8725 |                  |   |          |
|            |                     |                      |                       |                | 00°50.3556  | 74°37.7223 |                  |   |          |
|            |                     |                      |                       |                | 00°49.8031  | 74°35.5772 |                  |   |          |
|            |                     |                      |                       |                | 00°49.1532  | 74°32.9771 |                  |   |          |
| 00°48.6007 | 74°30.9295          |                      |                       |                |             |            |                  |   |          |
| 6/09/00    | Aerial aspersion    | Puerto Guzman        | San Roque             | 49.40          | 01°01.4017  | 76°01.2809 | 241              | Mandur river<br>Caqueta river                   |          |
|            |                     |                      |                       |                | 01°00.2221  | 75°57.2192 | 244              |   |          |
|            |                     |                      |                       |                | 01°00.2221  | 75°57.2172 |                  |   |          |
|            |                     |                      |                       |                | 01°58.6497  | 75°59.7079 |                  |   |          |
|            |                     | Solita               | Vereda Bocana Canelos | 51.00          | 01°57.3628  | 75°56.4307 |                  | Solita river<br>Caqueta river<br>Chontilloso C. |          |
|            |                     |                      |                       |                | 01°56.6831  | 75°43.8464 |                  |   |          |
|            |                     |                      |                       |                | 01°54.9792  | 75°37.0300 |                  |   |          |
|            |                     |                      |                       |                | 01°53.5374  | 75°31.9176 |                  |   |          |
|            |                     | Curillo Solano       | La Cocha Monuna       | 48.00<br>48.00 | 01°52.3577  | 75°26.6742 |                  | La Solita C.<br>Caqueta river                   |          |
|            |                     |                      |                       |                | 01°54.9792  | 75°45.4195 |                  |   |          |
|            |                     |                      |                       |                | 01°53.9306  | 75°41.0936 |                  |   |          |
|            |                     |                      |                       |                | 01°56.4210  | 75°51.0562 |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |
|            |                     |                      |                       |                |             |            |                  |   |          |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF CAQUETA AND PUTUMAYO

| DATE    | ACTIVITY            | MUNICIPALITY      | INSPECTION / DISTRICT           | AREA (ha) | COORDENATES  |  | AIRCRAFT PNC NO. | WATER BASIN                        | COMMENTS           |
|---------|---------------------|-------------------|---------------------------------|-----------|--|--|------------------|------------------------------------|--------------------|
|         |                     |                   |                                 |           | NORTH (N)  | WEST (W)   |                  |                                    |                    |
| 7/09/00 | No aerial aspersion | -                 | -                               | -         | -  | -  | -                | -                                  | Aircraft Servicing |
| 8/09/00 | No aerial aspersion | -                 | -                               | -         | -  | -  | -                | -                                  | Aircraft Servicing |
| 9/09/00 | Aerial aspersion    | Puerto Guzman     | La Estrella de Yurilla          | 50.10     | 00°51.5877<br>00°50.1111<br>00°49.4651<br>00°48.6345<br>00°48.3577<br>00°47.7116<br>00°47.0656<br>00°46.5119<br>00°45.5890<br>00°44.6661<br>00°44.2047<br>00°43.5587<br>00°43.0978<br>00°42.1744<br>00°41.0669<br>00°25.7606<br>00°25.2340<br>00°23.8649<br>00°22.6539<br>00°21.5481<br>00°20.2317<br>00°18.4941<br>00°17.2830<br>00°14.1763<br>00°12.1228<br>00°09.6479<br>00°14.7029<br>00°18.5467<br>00°19.9158 | 76°00.9350<br>75°54.5896<br>75°52.0976<br>75°48.8672<br>75°47.8520<br>75°45.4523<br>75°42.5911<br>75°40.7452<br>75°37.3302<br>75°34.0076<br>75°31.9771<br>75°29.5774<br>75°27.6392<br>75°24.1319<br>75°20.0709<br>76°05.7216<br>76°05.1951<br>76°04.1419<br>76°03.1415<br>76°02.2463<br>76°01.1932<br>75°59.7715<br>75°58.8237<br>75°56.1908<br>75°54.6112<br>75°51.4518<br>75°53.9793<br>75°57.0860<br>75°58.2444 | 243<br>244       | Yurilla river<br><br>Caqueta river |                    |
|         |                     | Puerto Asis       | El Hueso<br>Piñuña Blanco       | 12.00     |  |  |                  | Piñuña Blanco C.                   |                    |
|         |                     | Puerto Legúzizamo | Puerto Porvenir<br>Piñuña Negro | 47.50     |  |  |                  | Piñuña Negro C.<br>Putumayo river  |                    |
|         |                     |                   | Montepa                         |           |  |  |                  |                                    |                    |
|         |                     |                   | Puerto Ospina<br>PeñaColorada   |           |  |  |                  |                                    |                    |

TABLE No. 3.1  
AERIAL ASPERSION OF COCA ILLICIT CROPS  
DEPARTMENT OF CAQUETA AND PUTUMAYO

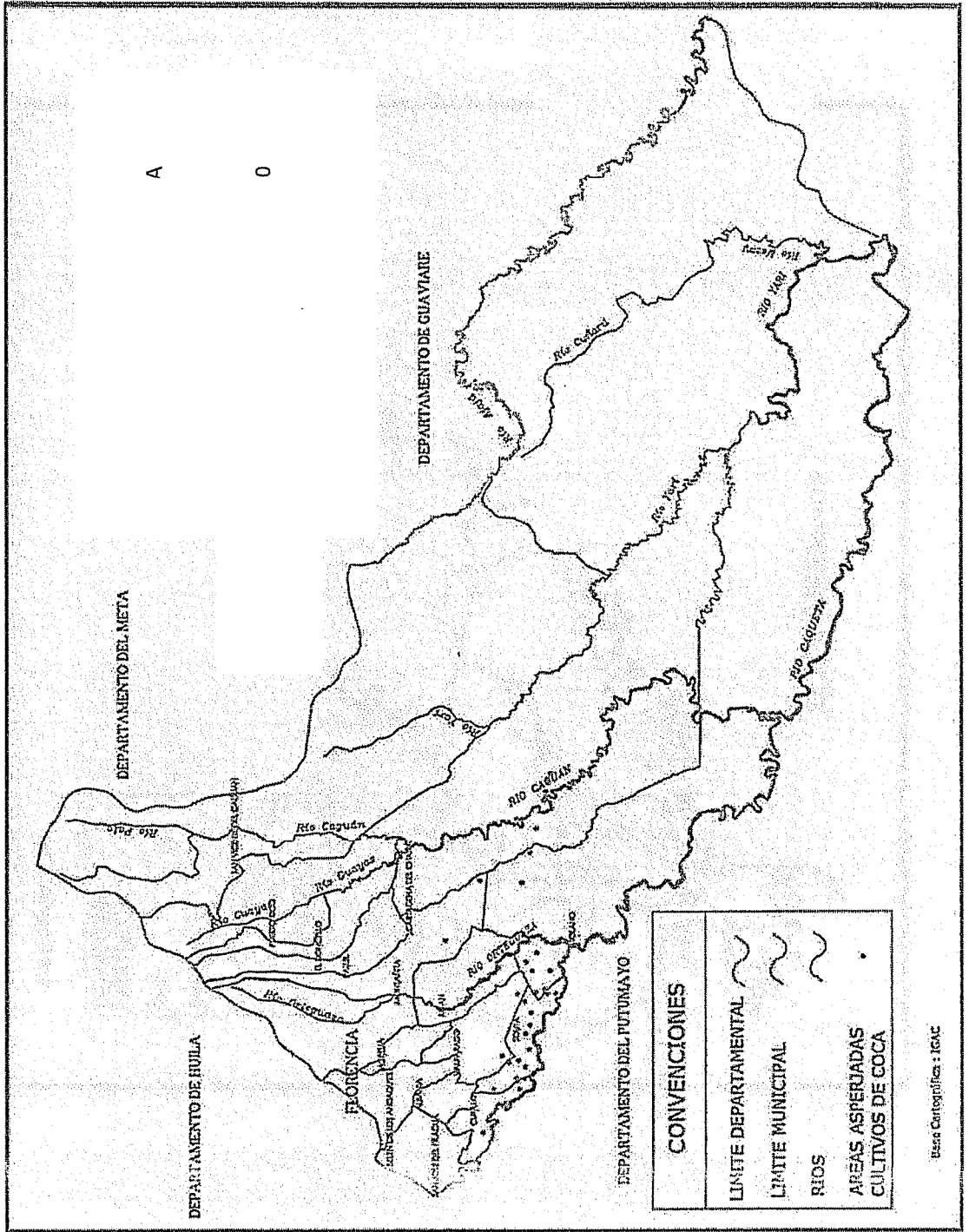
| DATE       | ACTIVITY         | MUNICIPALITY                   | INSPECTION /<br>DISTRICT   | AREA<br>(ha)  | COORDENATES |                  | AIRCRAFT<br>PNC NO. | WATER BASIN                                     | COMMENTS |
|------------|------------------|--------------------------------|----------------------------|---------------|-------------|------------------|---------------------|---|----------|
|            |                  |                                |                            |               | NORTH (N)   | WEST (W)         |                     |   |          |
| 10/09/00   | Aerial aspersion | Valparaiso<br>Puerto<br>Guzman | Vereda Fatima<br>San Roque | 1.00<br>16.00 | 01°12.67.58 | 75°36.4258       | 241                 | Pescado river<br>Caqueta river<br>Mandur river  |          |
|            |                  |                                |                            |               | 00°59.9175  | 75°58.9317       |                     |   |          |
|            |                  |                                |                            |               | 00°58.2560  | 76°00.7319       |                     |   |          |
|            |                  |                                |                            |               | 00°55.4869  | 75°554.0851      |                     |   |          |
|            |                  |                                |                            |               | 00°54.3792  | 75°58.5163       |                     |   |          |
|            |                  |                                |                            |               | 00°50.5024  | 75°58.5163       |                     |   |          |
|            |                  |                                |                            |               | 00°53.8254  | 75°39.2683       |                     |   |          |
|            |                  |                                |                            |               | 00°57.1484  | 75°48.4076       |                     |   |          |
|            |                  |                                |                            |               | 00°55.0715  | 75°48.4076       |                     |   |          |
|            |                  |                                |                            |               | 00°49.5332  | 75°26.9440       |                     |   |          |
|            |                  |                                |                            |               | 00°48.9793  | 75°33.4524       |                     |   |          |
|            |                  |                                |                            |               | 00°47.3178  | 75°26.9440       |                     |   |          |
|            |                  |                                |                            |               | 11/09/00    | Aerial aspersion |                     |   |          |
| 01°00.8490 | 75°42.7126       |                                |                            |               |             |                  |                     |   |          |
| 00°56.8541 | 75°26.9209       |                                |                            |               |             |                  |                     |   |          |
| 00°54.7615 | 75°19.1202       |                                |                            |               |             |                  |                     |   |          |
| 00°52.0983 | 75°16.8371       |                                |                            |               |             |                  |                     |   |          |
| 00°53.2397 | 75°21.4034       |                                |                            |               |             |                  |                     |   |          |
| 00°55.1420 | 75°28.8235       |                                |                            |               |             |                  |                     |   |          |
| 00°56.8541 | 75°36.0535       |                                |                            |               |             |                  |                     |   |          |
| 00°59.1369 | 75°44.4250       |                                |                            |               |             |                  |                     |   |          |
| 01°02.9416 | 75°51.0841       |                                |                            |               |             |                  |                     |   |          |
| 01°01.2295 | 75°53.1770       |                                |                            |               |             |                  |                     |   |          |
| 00°57.2346 | 75°48.2302       |                                |                            |               |             |                  |                     |   |          |
| 00°56.8541 | 76°03.6414       |                                |                            |               |             |                  |                     |   |          |
| 00°55.9027 | 76°10.3005       |                                |                            |               |             |                  |                     |   |          |
| 00°55.3322 | 76°16.3889       |                                |                            |               |             |                  |                     |   |          |
| 00°53.4299 | 76°15.8181       |                                |                            |               |             |                  |                     |   |          |
| 00°54.1908 | 76°07.8271       |                                |                            |               |             |                  |                     |   |          |
| 00°54.9518 | 76°00.4067       |                                |                            |               |             |                  |                     |   |          |
| 11/09/00   | Aerial aspersion | Puerto<br>Guzman               | La Esperanza<br>Las Perias | 26.10         | 01°01.2295  | 75°53.1770       |                     | Chontilloso C.<br>Solita river<br>La Canelos C. |          |
|            |                  |                                |                            |               | 00°57.2346  | 75°48.2302       |                     |   |          |
|            |                  |                                |                            |               | 00°56.8541  | 76°03.6414       |                     |   |          |
|            |                  |                                |                            |               | 00°55.9027  | 76°10.3005       |                     |   |          |
|            |                  |                                |                            |               | 00°55.3322  | 76°16.3889       |                     |   |          |
| 00°53.4299 | 76°15.8181       |                                |                            |               |             |                  |                     |   |          |
| 00°54.1908 | 76°07.8271       |                                |                            |               |             |                  |                     |   |          |
| 00°54.9518 | 76°00.4067       |                                |                            |               |             |                  |                     |   |          |

TABLE No. 3.1  
AERIAL ASPERSION OF ILLICIT COCA CROPS  
DEPARTMENT OF PUTUMAYO

| DATE     | ACTIVITY             | MUNICIPALITY  | INSPECTION / DISTRICT   | AREA (ha) | COORDENATES  |  | AIRCRAFT PNC NO. | WATER BASIN                        | COMMENTS  |
|----------|----------------------|---------------|-------------------------|-----------|--|--|------------------|------------------------------------|---|
|          |                      |               |                         |           | NORTH (N)  | WEST (W)   |                  |                                    |   |
| 12/09/00 | Aerial asperision    | Puerto Guzman | La Esperanza de Yurilla | 43.50     | 00°51.0183<br>00°50.2068<br>00°49.7818<br>00°48.5838<br>00°47.9269<br>00°47.2700<br>00°45.5270<br>00°44.1650<br>00°42.4515<br>00°41.0016 | 75°58.1648<br>78°55.1117<br>75°53.5658<br>75°49.0054<br>75°46.4934<br>75°43.9427<br>75°37.2784<br>75°32.1374<br>75°25.4147<br>75°20.0540 | 241              | Yurilla river<br><br>Caqueta river |   |
| 13/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Verification protocol                               |
| 14/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Verification protocol                               |
| 15/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Verification protocol                               |
| 16/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Verification protocol                               |
| 17/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Aircraft participating in the verification protocol |
| 18/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Aircraft participating in the verification protocol |
| 19/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Aircraft participating in the verification protocol |
| 20/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Aircraft participating in the verification protocol |
| 21/09/00 | No aerial asperision | -             | -                       | -         | -  | -  | -                | -                                  | Aircraft participating in the verification protocol |

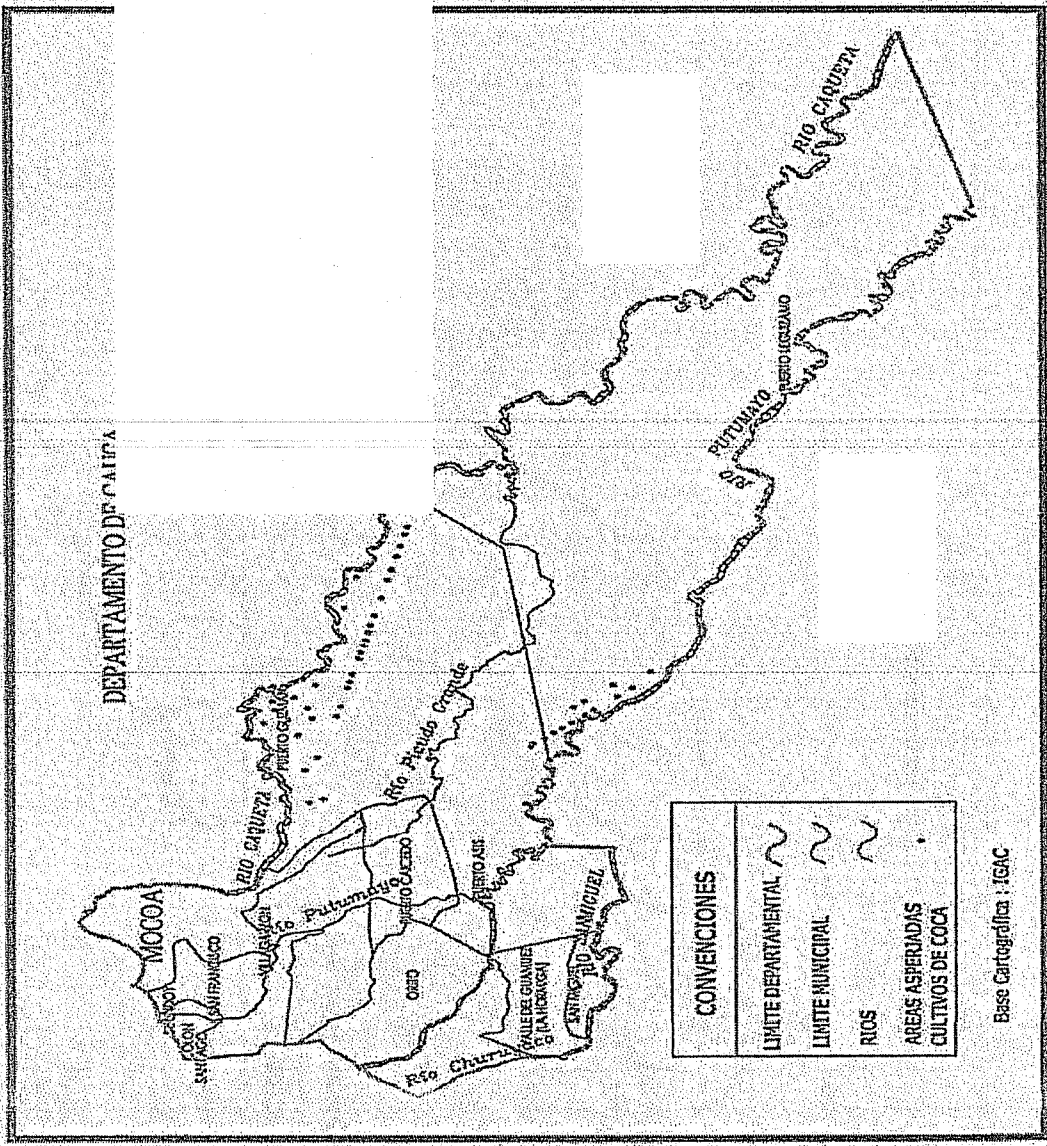
TABLE No. 3.1  
 AERIAL ASPERSION OF ILLICIT COCA CROPS  
 DEPARTMENT OF CAQUETA

| DATE     | ACTIVITY            | MUNICIPALITY | INSPECTION /<br>DISTRICT | AREA<br>(ha) | COORDENATES |          | AIRCRAFT<br>PNC NO. | WATER BASIN | COMMENTS  |
|----------|---------------------|--------------|--------------------------|--------------|-------------|----------|---------------------|-------------|---|
|          |                     |              |                          |              | NORTH (N)   | WEST (W) |                     |             |   |
| 22/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Aircraft participating in the verification protocol |
| 23/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Aircraft participating in the verification protocol |
| 24/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Aircraft transfer to Sam Jose de Guaviare Base      |
| 25/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Aircraft transfer to Sam Jose de Guaviare Base      |
| 26/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Suspension of activities                            |
| 27/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Suspension of activities                            |
| 28/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Suspension of activities                            |
| 29/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Suspension of activities                            |
| 30/09/00 | No aerial aspersion | -            | -                        | -            | -           | -        | -                   | -           | Suspension of activities                            |

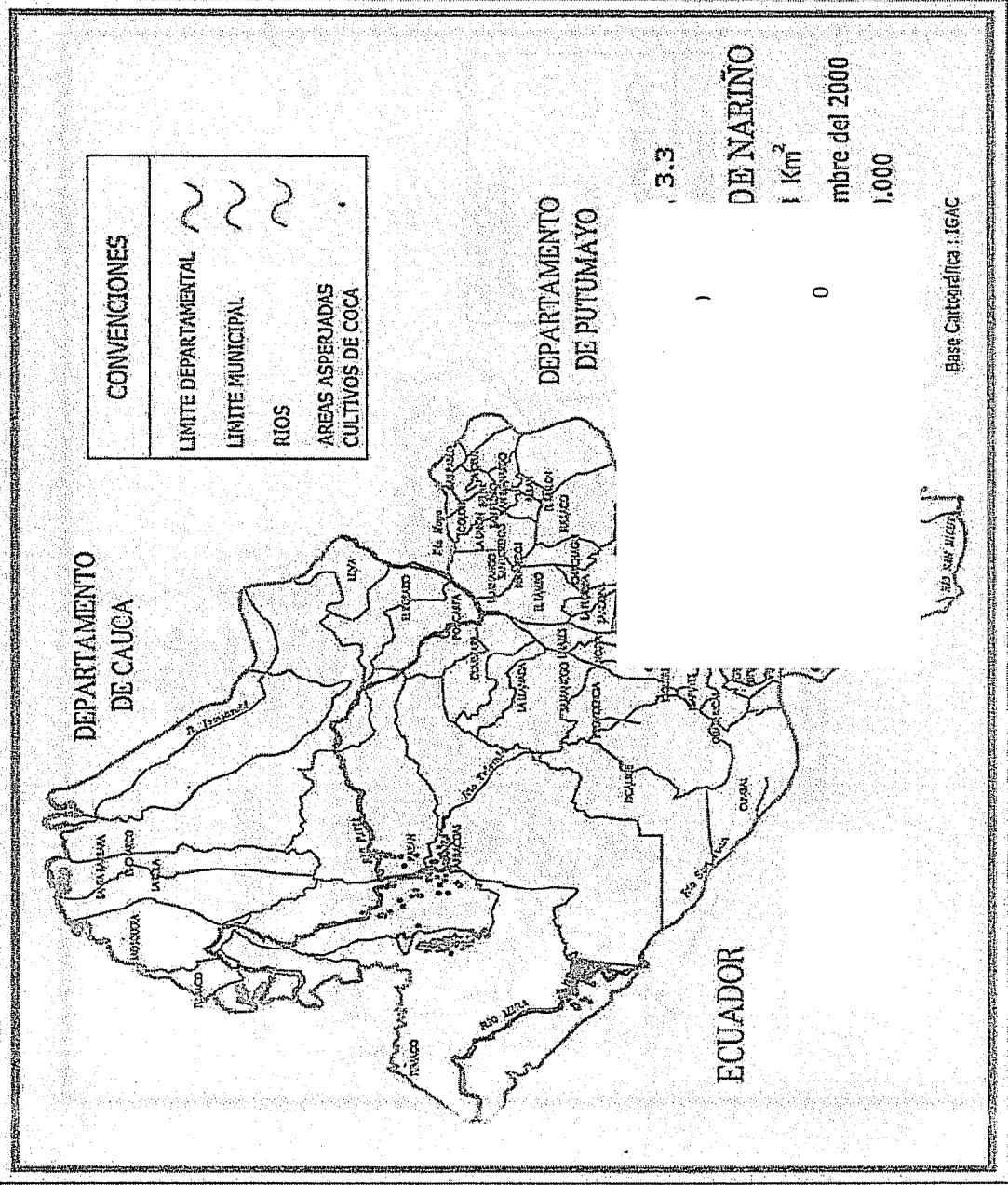


| CONVENCIONES |                                    |
|--------------|------------------------------------|
|              | LIMITE DEPARTAMENTAL               |
|              | LIMITE MUNICIPAL                   |
|              | RIOS                               |
|              | AREAS ASPERUJADAS CULTIVOS DE COCA |

Basa Cartográfica : IGAC

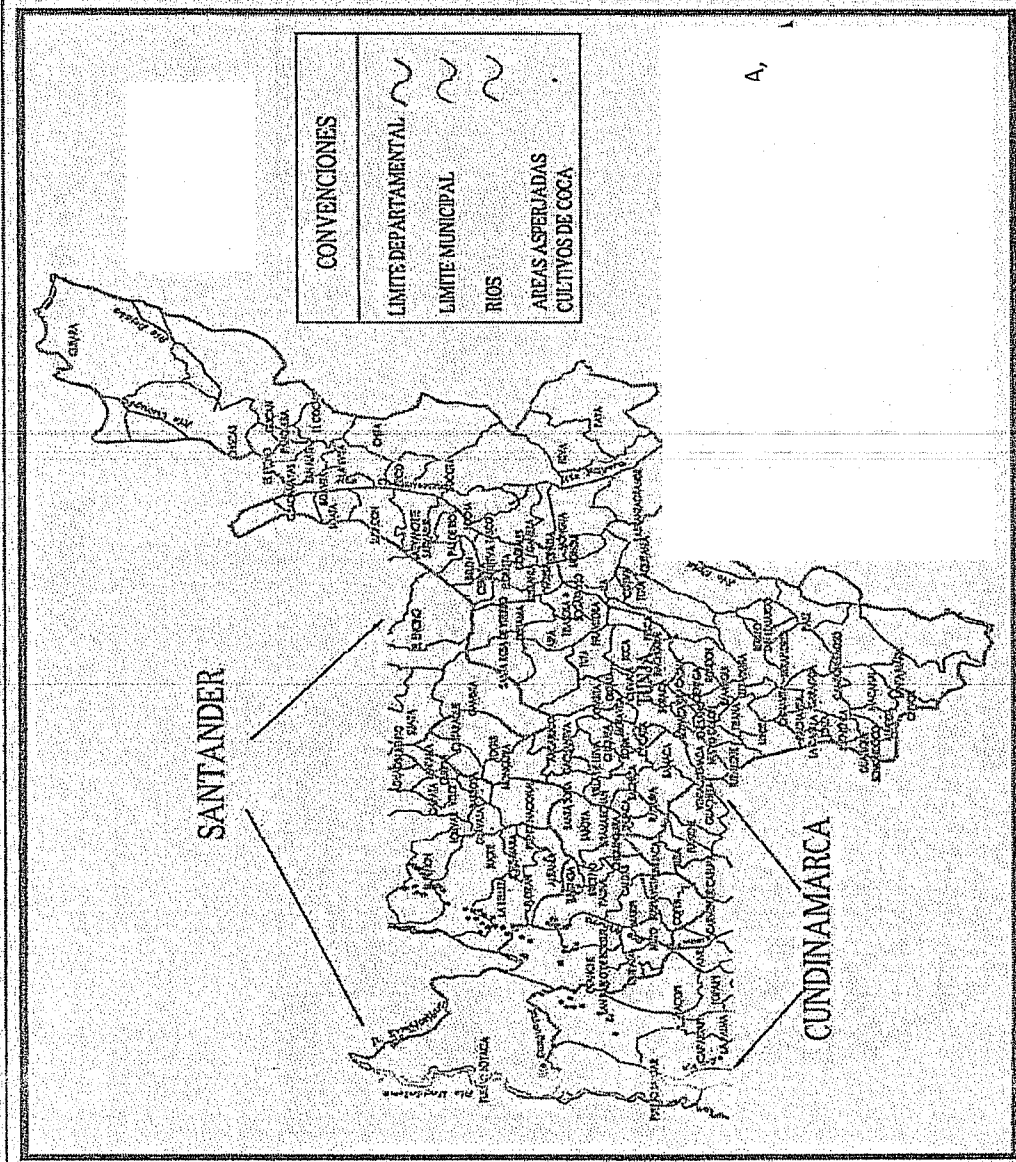






| CONVENCIONES                      |   |
|-----------------------------------|---|
| LÍMITE DEPARTAMENTAL              | ~ |
| LÍMITE MUNICIPAL                  | ~ |
| RIOS                              | ~ |
| ÁREAS ASPERJADAS CULTIVOS DE COCA | . |





**CHART NO. 3.2**  
**METEOROLOGICAL CONDITIONS FOR AERIAL SPRAYING OF COCA CROPS**  
**IN THE DEPARTMENTS OF CAQUETA – PUTUMAYO - CAUCA - NARIÑO.**  
**SEPTEMBER, 2000**

| DATE | AERIAL<br>SPRAYING | TEMPERATURE<br>°C | RELATIVE<br>HUMIDITY<br>% | WINDS<br>(KNOTS) | TIME OF<br>APPLICATION<br>(AM) | COMMENTS   |
|------|--------------------|-------------------|---------------------------|------------------|--------------------------------|--|
| 1    | YES                | 22 - 30           | 75                        | 0 - 3            | 9:35 - 14:15                   | Bad weather<br>conditions<br>Bad weather<br>conditions |
| 2    | NO                 |                   |                           |                  |                                |  |
| 3    | NO                 |                   |                           |                  |                                |  |
| 4    | YES                | 33 - 30           | 75                        | 0 - 3            | 9:20 - 15:10                   |  |
| 5    | YES                | 28 - 30           | 75                        | 0 - 3            | 12:20 - 15:20                  |  |
| 6    | YES                | 28 - 30           | 75                        | 0 - 3            | 12:55 - 14:15                  |  |
| 7    | NO                 |                   |                           |                  |                                |  |
| 8    | YES                | 22 - 30           | 75                        | 0 - 3            | 9:15 - 14:35                   |  |
| 9    | YES                | 22 - 28           | 75                        | 0 - 2            | 8:38 - 11:08                   |  |
| 10   | YES                | 26 - 28           | 75                        | 0 - 2            | 10:20 - 13:45                  |  |
| 11   | YES                | 20 - 28           | 75                        | 0 - 3            | 7:55 - 13:00                   |  |
| 12   | YES                | 21 - 28           | 75                        | 0 - 3            | 7:20 - 12:55                   |  |
| 13   | YES                | 28 - 30           | 75                        | 0 - 3            | 12:40 - 13:45                  |  |
| 14   | YES                | 27 - 30           | 75                        | 0 - 3            | 11:00 - 14:00                  |  |
| 15   | YES                | 22 - 30           | 75                        | 0 - 3            | 9:02 - 14:15                   |  |
| 16   | NO                 |                   |                           |                  |                                |  |
| 17   | NO                 |                   |                           |                  |                                |  |
| 18   | NO                 |                   |                           |                  |                                |  |
| 19   | NO                 |                   |                           |                  |                                |  |
| 20   | NO                 |                   |                           |                  |                                |  |
| 21   | YES                | 20 - 25           | 80                        | 2                | 6:10 - 10:55                   |  |
| 22   | YES                | 23 - 26           | 80                        | 3                | 9:40 - 11:20                   |  |
| 23   | YES                | 20 - 25           | 85                        | 2                | 6:15 - 10:00                   |  |
| 24   | NO                 |                   |                           |                  |                                |  |
| 25   | NO                 |                   |                           |                  |                                |  |
| 26   | NO                 |                   |                           |                  |                                |  |
| 27   | SI                 | 23 - 28           | 80                        | 3                | 10:30 - 12:15                  |  |
| 28   | SI                 | 24 - 28           | 80                        | 3                | 9:25 - 12:00                   |  |
| 29   | NO                 |                   |                           |                  |                                |  |
| 30   | NO                 |                   |                           |                  |                                |  |

**3.2 ANALYSIS OF AERIAL SPRAYING RECORDS.**

Based on reports provided by Dyncorp, CHART 3.4 is presented, which analyzes each of the spraying missions, the range of variation between the area recorded by the "Satloc" system in relation to the possible theoretical area according to a projected glyphosate formulation of 2.74 gallons /ha for coca crops and 0.66 gallons /ha for poppy crops. The effective applied dose was also calculated, based on the area recorded by the "Satloc" system and the glyphosate used by each aircraft.

The range of variation used for the analysis was + or - 5%.

**Analysis of illicit coca crop spraying missions. September 1-30, 2000.**

|                                     | <b>Number</b> | <b>Percentage (%)</b> |
|-------------------------------------|---------------|-----------------------|
| Total number of missions:           | 96            | 100.00                |
| Number of under-dosed applications: | 41            | 42.70                 |
| Number of overdosed applications:   | 18            | 18.75                 |
| Total applications out of range:    | <b>59</b>     | <b>61.45</b>          |

**Analysis of illicit poppy crop spraying missions. September 1-30, 2000**

|                                     | <b>Number</b> | <b>Percentage (%)</b> |
|-------------------------------------|---------------|-----------------------|
| Total number of missions:           | 0             | 0.0                   |
| Number of under-dosed applications: | 0             | 0.0                   |
| Number of overdosed applications:   | 0             | 0.0                   |
| Total applications out of range:    | 0             | 0.0                   |

Based on the review of the records, the following recommendations are made:

- Calibration and more frequent inspection of the spraying equipment of the Turbo Thrush type aircraft

TABLE No. 3.4  
ANALYSIS OF AERIAL SPRAYING WITH GLYPHOSATE  
ILICIT COCA-LEAF CROPS  
PERIOD 1 – 30 SEPTEMBER 2000

| No. | FLIGHT CODE | SPRAYED AREA ACCORDING TO SATLOC | THEORETICAL AREA ACCORDING TO GLYPHOSATE VOLUME SPENT (1) | DIFFERENCE SPRAYED AREA & THEORETICAL AREA | PERCENTAGE OF DIFFERENCE SPRAYED AREA & THEORETICAL AREA | HERBICIDE VOLUME PER REPORT | THEORETICAL GLYPHOSATE VOLUME TO BE SPENT(3) | PERCENTAGE DIFFERENCE VOLUME SPENT & THEORETICAL VOLUME | DOSAGE APPLIED ACCORDING TO SPRAYED AREA |
|-----|-------------|----------------------------------|---|--|--|-----------------------------|--|---|--|
|     |             | (ha)                             | (ha)  | (ha)                                       | %  | (gl)                        | (gl)   | %   | (gl/ha)                                  |
| 1   | I010J#BC    | 0.00                             | 0.00  | 0.00                                       | 0.00   | 0.00                        | 0.00   | 0.00  | 0.00                                     |
| 2   | I010KFBC    | 56.00                            | 55.40   | 0.60                                       | 1.08   | 152.21                      | 153.85                                       | -1.07   | 2.72                                     |
| 3   | I010CBBC    | 46.70                            | 55.89   | -9.19                                      | -16.44   | 153.55                      | 128.30                                       | 19.68   | 3.29                                     |
| 4   | I010EFCC    | 56.00                            | 55.40   | 0.60                                       | 1.08   | 152.21                      | 153.85                                       | -1.07   | 2.72                                     |
| 5   | I010D#CC    | 56.00                            | 55.49   | 0.60                                       | 1.08   | 152.21                      | 153.85                                       | -1.07   | 2.72                                     |
| 6   | I010CBCC    | 54.50                            | 55.66   | -1.16                                      | -2.08  | 152.91                      | 149.73                                       | 2.12  | 2.81                                     |
| 7   | I010BAC     | 43.30                            | 55.27   | -11.97                                     | -21.66   | 151.86                      | 118.96                                       | 27.65   | 3.51                                     |
| 8   | I010KFAC    | 56.00                            | 55.40   | 0.60                                       | 1.08   | 152.21                      | 153.85                                       | -1.07   | 2.72                                     |
| 9   | I010J#AC    | 58.80                            | 56.30   | 2.50                                       | 4.45   | 154.67                      | 161.55                                       | -4.26   | 2.63                                     |
| 10  | I040E#BC    | 68.20                            | 56.59   | 11.61                                      | 20.52  | 155.47                      | 187.37                                       | -17.03  | 2.28                                     |
| 11  | I040DFBC    | 55.80                            | 55.21   | 0.59                                       | 1.08   | 151.67                      | 153.30                                       | -1.07   | 2.72                                     |
| 12  | I040CBBC    | 66.40                            | 56.16   | 10.24                                      | 18.24  | 154.28                      | 182.43                                       | -15.43  | 2.32                                     |
| 13  | I040DFCC    | 75.60                            | 55.49   | 20.11                                      | 36.23  | 152.46                      | 207.70                                       | -26.60  | 2.02                                     |
| 14  | I040E#CC    | 67.80                            | 56.26   | 11.54                                      | 20.52  | 154.56                      | 186.27                                       | -17.02  | 2.28                                     |
| 15  | I040KBCC    | 59.70                            | 56.21   | 3.49                                       | 6.22   | 154.42                      | 164.02                                       | -5.85   | 2.59                                     |
| 16  | I040E#DC    | 71.80                            | 57.29   | 14.51                                      | 25.33  | 157.39                      | 197.26                                       | -20.21  | 2.19                                     |
| 17  | I040KBDC    | 67.10                            | 56.75   | 10.35                                      | 18.24  | 155.91                      | 184.35                                       | -13.43  | 2.32                                     |
| 18  | I040DFDC    | 74.30                            | 55.72   | 18.58                                      | 33.34  | 153.09                      | 204.13                                       | -25.00  | 2.06                                     |
| 19  | I040CBAC    | 72.20                            | 57.60   | 14.60                                      | 25.34  | 158.26                      | 198.36                                       | -20.22  | 2.19                                     |
| 20  | I040JAC     | 20.40                            | 23.76   | -3.36                                      | -14.16   | 65.29                       | 56.05  | 16.49   | 3.20                                     |
| 21  | I040E#AC    | 59.00                            | 55.55   | 3.45                                       | 6.22   | 152.61                      | 162.10                                       | -5.85   | 2.59                                     |
| 22  | I050JBAC    | 72.20                            | 55.68   | 17.02                                      | 30.56  | 152.98                      | 199.74                                       | -23.41  | 2.10                                     |
| 23  | I050E#AC    | 56.00                            | 55.40   | 0.60                                       | 1.08   | 152.21                      | 153.85                                       | -1.07   | 2.72                                     |
| 24  | I050DFAC    | 58.00                            | 55.53   | 2.47                                       | 4.45   | 152.56                      | 159.35                                       | -4.26   | 2.63                                     |
| 25  | I050E#BC    | 60.00                            | 56.49   | 3.51                                       | 6.22   | 155.19                      | 164.84                                       | -5.86   | 2.59                                     |
| 26  | I050DFBC    | 58.00                            | 55.53   | 2.47                                       | 4.45   | 152.56                      | 159.35                                       | -4.26   | 2.63                                     |
| 27  | I050JBBC    | 48.90                            | 54.62   | -5.72                                      | -10.47   | 150.06                      | 134.35                                       | 11.70   | 3.07                                     |

TABLE No. 3.4  
ANALYSIS OF AERIAL SPRAYING WITH GLYPHOSATE  
ILLICIT COCA-LEAF CROPS  
PERIOD 1 - 30 SEPTEMBER 2000

| No. | SPRAYED AREA ACCORDING TO SATLOC (ha) | THEORETICAL AREA ACCORDING TO GLYPHOSATE VOLUME SPENT (1) (ha) | DIFFERENCE SPRAYED AREA & THEORETICAL AREA (ha) | PERCENTAGE OF DIFFERENCE SPRAYED AREA & THEORETICAL AREA % | HERBICIDE VOLUME PER REPORT (gl) | THEORETICAL GLYPHOSATE VOLUME TO BE SPENT(S) (gl) | PERCENTAGE DIFFERENCE VOLUME SPENT & THEORETICAL VOLUME % | DOSAGE APPLIED ACCORDING TO SPRAYED AREA (gl/ha) |
|-----|---------------------------------------|--|---|--|----------------------------------|---|---|--|
| 28  | I050S4AC                              | 23.20  | 22.95   | 0.25   | 63.06                            | 63.74   | -1.07   | 2.72   |
| 29  | I050TOAC                              | 21.90  | 21.67   | 0.23   | 59.53                            | 60.17   | -1.06   | 2.72   |
| 30  | I060R4BC                              | 48.00  | 47.49   | 0.51   | 130.47                           | 131.87  | -1.07   | 2.72   |
| 31  | I060TOBC                              | 48.00  | 47.49   | 0.51   | 130.47                           | 131.87  | -1.07   | 2.72   |
| 32  | I060R4AC                              | 51.00  | 50.46   | 0.54   | 138.62                           | 140.12  | -1.07   | 2.72   |
| 33  | I060TOAC                              | 49.40  | 48.09   | 1.31   | 132.11                           | 132.72  | -2.66   | 2.67   |
| 34  | I060JBAC                              | 59.50  | 56.02   | 3.48   | 153.90                           | 163.47  | -5.85   | 2.59   |
| 35  | I060KDAC                              | 40.00  | 28.72   | 11.28  | 78.91                            | 109.90  | -28.20  | 1.97   |
| 36  | I060E#AC                              | 58.00  | 55.53   | 2.47   | 152.56                           | 159.35  | -4.26   | 2.63   |
| 37  | I060DFAC                              | 58.00  | 55.53   | 2.47   | 152.56                           | 159.35  | -4.26   | 2.63   |
| 38  | I080KDBC                              | 62.00  | 56.39   | 5.61   | 154.93                           | 170.34  | -9.05   | 2.50   |
| 39  | I080D#BC                              | 54.00  | 47.39   | 6.61   | 130.20                           | 148.36  | -12.24  | 2.41   |
| 40  | I080JBBC                              | 56.00  | 55.40   | 0.60   | 152.21                           | 135.85  | -1.07   | 2.72   |
| 41  | I080JBAC                              | 55.10  | 55.39   | -0.29  | 152.18                           | 151.38  | 0.53  | 2.76   |
| 42  | I080D#AC                              | 59.00  | 55.55   | 3.45   | 152.61                           | 162.10  | -5.85   | 2.59   |
| 43  | I080KDAC                              | 64.00  | 55.15   | 8.85   | 151.51                           | 175.83  | -13.83  | 2.37   |
| 44  | I090R4AC                              | 59.50  | 57.92   | 1.58   | 159.12                           | 163.47  | -2.66   | 2.67   |
| 45  | I090R4BC                              | 50.10  | 49.57   | 0.53   | 136.18                           | 137.64  | -1.06   | 2.72   |
| 46  | I100ROAC                              | 55.30  | 54.71   | 0.59   | 150.31                           | 151.93  | -1.07   | 2.72   |
| 47  | I100KDAC                              | 51.80  | 55.38   | -3.58  | 152.15                           | 142.31  | 6.91  | 2.94   |
| 48  | I100JBAC                              | 60.00  | 55.53   | 4.47   | 152.56                           | 164.84  | -7.45   | 2.54   |
| 49  | I100D#AC                              | 65.00  | 56.01   | 8.99   | 153.88                           | 178.58  | -13.83  | 2.37   |
| 50  | I110T4AC                              | 44.00  | 43.53   | 0.47   | 119.60                           | 120.89  | -1.06   | 2.72   |
| 51  | I110T4BC                              | 46.10  | 46.34   | -0.24  | 127.32                           | 126.65  | 0.53  | 2.76   |
| 52  | I110D#AC                              | 61.00  | 56.46   | 4.54   | 155.11                           | 167.59  | -7.45   | 2.54   |
| 53  | I110KDAC                              | 51.20  | 45.75   | 5.45   | 125.70                           | 140.67  | -10.64  | 2.46   |
| 54  | I110JBAC                              | 50.00  | 46.28   | 3.72   | 127.14                           | 137.37  | -7.45   | 2.54   |

TABLE No. 3.4  
ANALYSIS OF AERIAL SPRAYING WITH GLYPHOSATE  
ILICIT COCA-LEAF CROPS  
PERIOD 1 - 30 SEPTEMBER 2000

| No. | SPRAYED AREA<br>ACCORDING TO<br>SATLOC<br>(ha) | THEORETICAL<br>AREA<br>ACCORDING TO<br>GLYPHOSATE<br>VOLUME SPENT<br>(1)<br>(ha) | DIFFERENCE<br>SPRAYED AREA<br>&<br>THEORETICAL<br>AREA<br>(ha) | PERCENTAGE<br>OF<br>DIFFERENCE<br>SPRAYED AREA<br>&<br>THEORETICAL<br>AREA<br>% | HERBICIDE<br>VOLUME PER<br>REPORT<br>(gl) | THEORETICAL<br>GLYPHOSATE<br>VOLUME TO BE<br>SPENT(3)<br>(gl) | PERCENTAGE<br>DIFFERENCE<br>VOLUME SPENT<br>&<br>THEORETICAL<br>VOLUME<br>% | DOSAGE<br>APPLIED<br>ACCORDING TO<br>SPRAYED AREA<br>(gl/ha) |
|-----|--|--|--|---|---|---|---|--|
| 55  | I120TOAC                                       | 43.04  | 0.46   | 1.08  | 118.24                                    | 119.51  | -1.06   | 2.72   |
| 56  | I120EBAC                                       | 32.80  | 0.87   | 2.73  | 87.72                                     | 90.11   | -2.66   | 2.67   |
| 57  | I120KDAC                                       | 33.40  | 1.42   | 4.44  | 87.86                                     | 91.76   | -4.25   | 2.63   |
| 58  | I120D#AC                                       | 32.80  | 0.87   | 2.73  | 87.72                                     | 90.11   | -2.66   | 2.67   |
| 59  | I130CZAC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 60  | I130J1AC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 61  | I130DJAC                                       | 53.60  | -1.99  | -3.59   | 152.74                                    | 147.26  | 3.72  | 2.85   |
| 62  | I130KDAC                                       | 51.70  | 2.20   | 4.45  | 135.99                                    | 142.04  | -4.26   | 2.63   |
| 63  | I140CZAC                                       | 56.00  | 0.60   | 1.08  | 152.21                                    | 153.85  | -1.07   | 2.72   |
| 64  | I140KDAC                                       | 56.00  | 0.60   | 1.08  | 152.21                                    | 153.85  | -1.07   | 2.72   |
| 65  | I140DJAC                                       | 58.10  | 2.47   | 4.44  | 152.83                                    | 159.62  | -4.26   | 2.63   |
| 66  | I140J1AC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 67  | I140CZBC                                       | 56.80  | 0.60   | 1.08  | 154.39                                    | 156.05  | -1.06   | 2.72   |
| 68  | I140J1BC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 69  | I150CZAC                                       | 53.30  | -1.98  | -3.58   | 151.88                                    | 146.44  | 3.72  | 2.85   |
| 70  | I150CZBC                                       | 56.30  | 0.60   | 1.08  | 153.03                                    | 154.68  | -1.07   | 2.72   |
| 71  | I150CZCC                                       | 50.90  | -4.33  | -7.84   | 151.74                                    | 139.84  | 8.51  | 2.98   |
| 72  | I150DDAC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 73  | I150DDBC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 74  | I150DDCC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 75  | I150J1AC                                       | 65.60  | 8.03   | 13.95   | 158.17                                    | 180.23  | -12.24  | 2.41   |
| 76  | I150J1BC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 77  | I150J1CC                                       | 56.00  | 0.15   | 0.27  | 153.44                                    | 153.85  | -0.27   | 2.74   |
| 78  | I210J1AC                                       | 32.20  | 0.29   | 0.92  | 87.66                                     | 88.47   | -0.91   | 2.72   |
| 79  | I210CZAC                                       | 35.30  | 3.19   | 9.95  | 88.21                                     | 96.98   | -9.05   | 2.50   |
| 80  | I210DJAC                                       | 29.10  | 3.56   | 13.94   | 70.17                                     | 79.95   | -12.23  | 2.41   |
| 81  | I210J1BC                                       | 32.20  | 0.29   | 0.92  | 87.66                                     | 88.47   | -0.91   | 2.72   |

TABLE No. 3.4  
 ANALYSIS OF AERIAL SPRAYING WITH GLYPHOSATE  
 ILLICIT COCA-LEAF CROPS  
 PERIOD 1 – 30 SEPTEMBER 2000

| No. | SPRAYED AREA<br>ACCORDING TO<br>SATLOC | THEORETICAL<br>AREA<br>ACCORDING TO<br>GLYPHOSATE<br>VOLUME SPENT<br>(1) | DIFFERENCE<br>SPRAYED AREA<br>&<br>THEORETICAL<br>AREA | PERCENTAGE<br>OF<br>DIFFERENCE<br>SPRAYED AREA<br>&<br>THEORETICAL<br>AREA | HERBICIDE<br>VOLUME PER<br>REPORT | THEORETICAL<br>GLYPHOSATE<br>VOLUME TO BE<br>SPENT(2) | PERCENTAGE<br>DIFFERENCE<br>VOLUME SPENT<br>&<br>THEORETICAL<br>VOLUME | DOSAGE<br>APPLIED<br>ACCORDING TO<br>SPRAYED AREA |
|-----|--|--|--|--|-----------------------------------|---|--|---|
|     |  |  |  |  |                                   |   |  |   |
| 82  | 29.00                                  | 31.47  | -2.47  | -7.84  | 86.45                             | 79.67   | 8.50   | 2.98  |
| 83  | 31.90                                  | 31.56  | 0.34   | 1.07   | 86.71                             | 87.64   | -1.06  | 2.72  |
| 84  | 32.20                                  | 31.91  | 0.29   | 0.92   | 87.66                             | 88.47   | -0.91  | 2.72  |
| 85  | 30.60                                  | 31.74  | -1.14  | -3.59  | 87.20                             | 84.07   | 3.72   | 2.85  |
| 86  | 31.50                                  | 31.67  | -0.17  | -0.53  | 87.00                             | 86.54   | 0.53   | 2.76  |
| 87  | 35.70                                  | 31.90  | 3.80   | 11.91  | 87.64                             | 98.08   | -10.65   | 2.45  |
| 88  | 26.80                                  | 31.64  | -4.84  | -15.31   | 86.94                             | 73.63   | 18.08  | 3.24  |
| 89  | 31.40                                  | 31.56  | -0.16  | -0.52  | 86.72                             | 86.27   | 0.52   | 2.76  |
| 90  | 28.00                                  | 31.72  | -3.72  | -11.73   | 87.15                             | 76.93   | 13.29  | 3.11  |
| 91  | 30.70                                  | 31.84  | -1.14  | -3.58  | 87.48                             | 84.34   | 3.72   | 2.85  |
| 92  | 33.50                                  | 31.54  | 1.96   | 6.22   | 86.65                             | 92.04   | -5.85  | 2.59  |
| 93  | 23.10                                  | 23.96  | -0.86  | -3.59  | 65.83                             | 63.46   | 3.73   | 2.85  |
| 84  | 21.20                                  | 31.80  | -10.60   | -33.33   | 87.36                             | 58.24   | 49.99  | 4.12  |
| 95  | 32.00                                  | 31.91  | 0.09   | 0.27   | 87.68                             | 87.92   | -0.27  | 2.74  |
| 96  | 26.10                                  | 31.65  | -5.55  | -17.54   | 86.96                             | 71.71   | 21.27  | 3.33  |
|     | <b>4717.60</b>                         | <b>4529.58</b>   | <b>188.02</b>  | <b>4.15</b>  | <b>12444.52</b>                   | <b>12961.08</b>                                       | <b>-3.99</b>   | <b>2.66</b>                                       |



### 3.2.1. Working indicators.

In September, the following working indicators were established for the Larandia (Caquetá) Base of Operations:

| Activity and/or motive                                      | Days      | %            |
|---|-----------|--------------|
| Possible work days  | 30        | 100.00       |
| • <i>Spraying area</i>                                      | <b>06</b> | <b>20.00</b> |
| Days of no spraying   | 24        | 80.00        |
| • <i>Lack of pilots</i>                                     | 04        | 13.34        |
| • <i>Lack of escort aircraft</i>                            | 02        | 06.67        |
| • <i>Verification protocol</i>                              | 11        | 36.66        |
| • <i>Transfer of aircraft to San José del Guaviare Base</i> | 02        | 06.67        |
| • <i>Suspension of activities</i>                           | 05        | 16.66        |

The following work indicators were established for the Mariquita, (Boyacá, Santander) Base of Operations:

| Activity and/or motive              | Days      | %            |
|-------------------------------------|-----------|--------------|
| Possible work days                  | 07        | 100          |
| • <i>Spraying area</i>              | <b>05</b> | <b>71.42</b> |
| Days of no spraying                 | 02        | 28.58        |
| • Adverse atmospheric conditions    | 01        | 14.29        |
| • Aircraft on interdiction missions | 01        | 14.29        |

The following work indicators were established for the Tumaco (Nariño) Base of Operations:

| Activity and/or motive              | Days      | %            |
|-------------------------------------|-----------|--------------|
| Possible work days                  | 19        | 100          |
| • <i>Spraying area</i>              | <b>11</b> | <b>57.90</b> |
| Days of no spraying                 | 08        | 42.10        |
| • Adverse atmospheric conditions    | 03        | 15.79        |
| • Aircraft on interdiction missions | 01        | 5.26         |
| • Suspension of activities          | 01        | 5.26         |
| • Transfer to base at Mariquita     | 03        | 15.79        |

The Antinarcotics Airbase at San Jose del Guaviare is inactive due to the transfer of aircraft and equipment to other bases in the country.

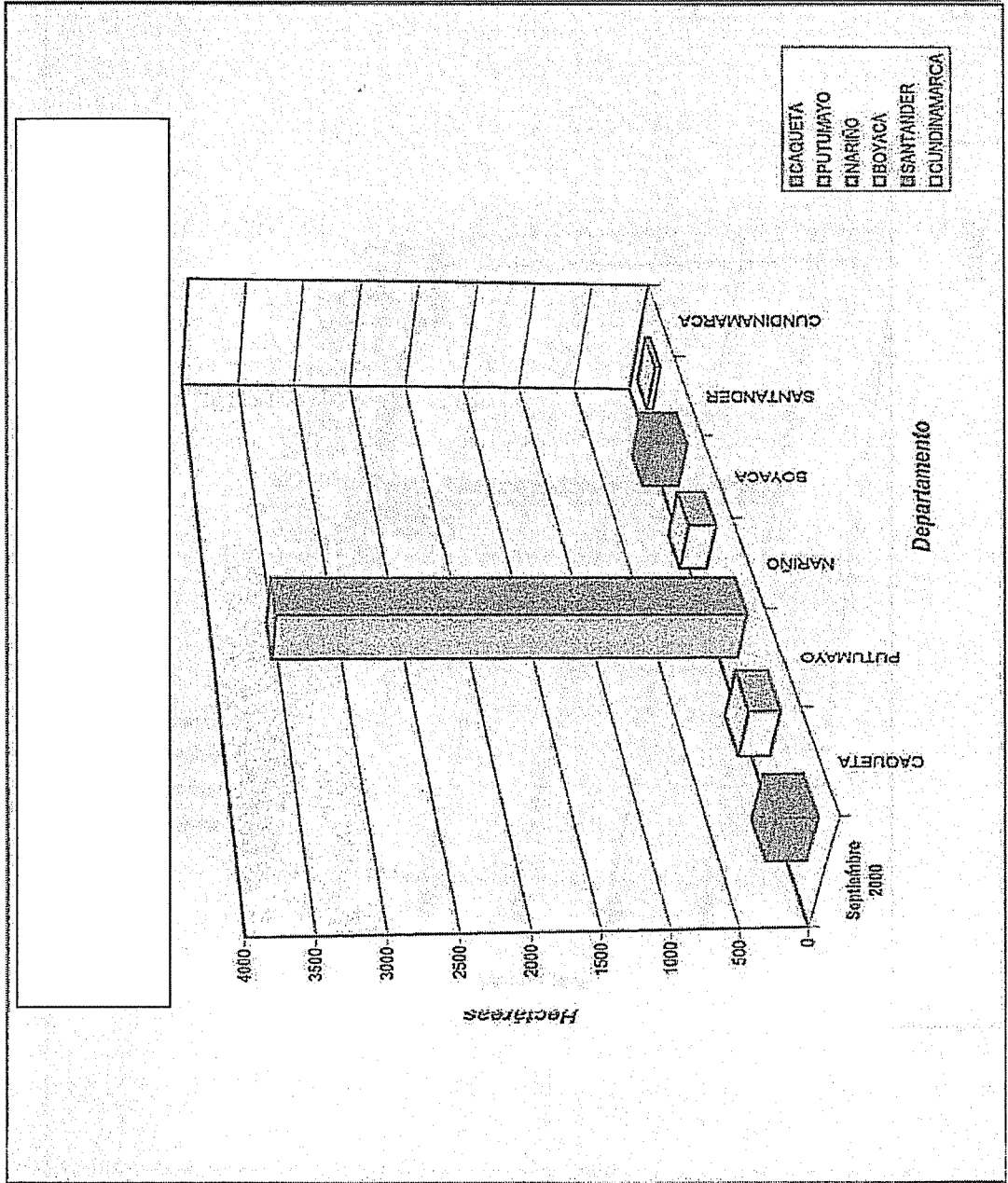
GRAPH number 3.1 shows the statistics for aerial spraying of illicit coca crops by Departments.

GRAPH number 3.2 shows the statistics for aerial spraying of illicit coca crops according to municipalities.

GRAPH number 3.3 shows the statistics for aerial spraying of illicit poppy crops by Departments.

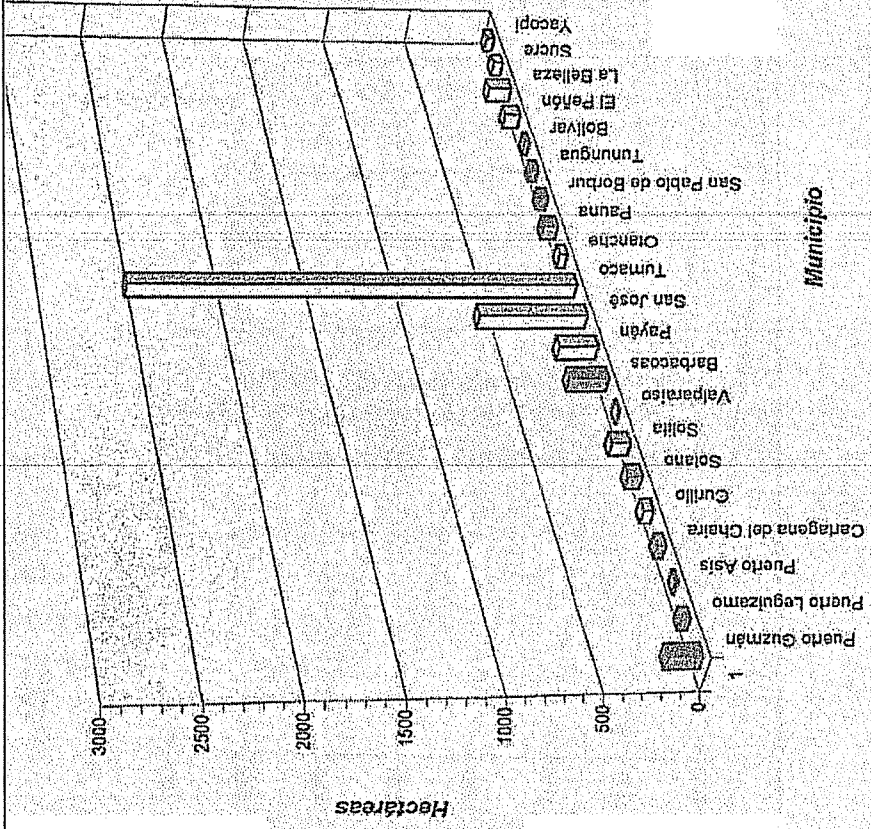
GRAPH number 3.4 shows the statistics for aerial spraying of illicit poppy crops according to municipalities.

GRAPH No. 3.1



GRAPH 3.2

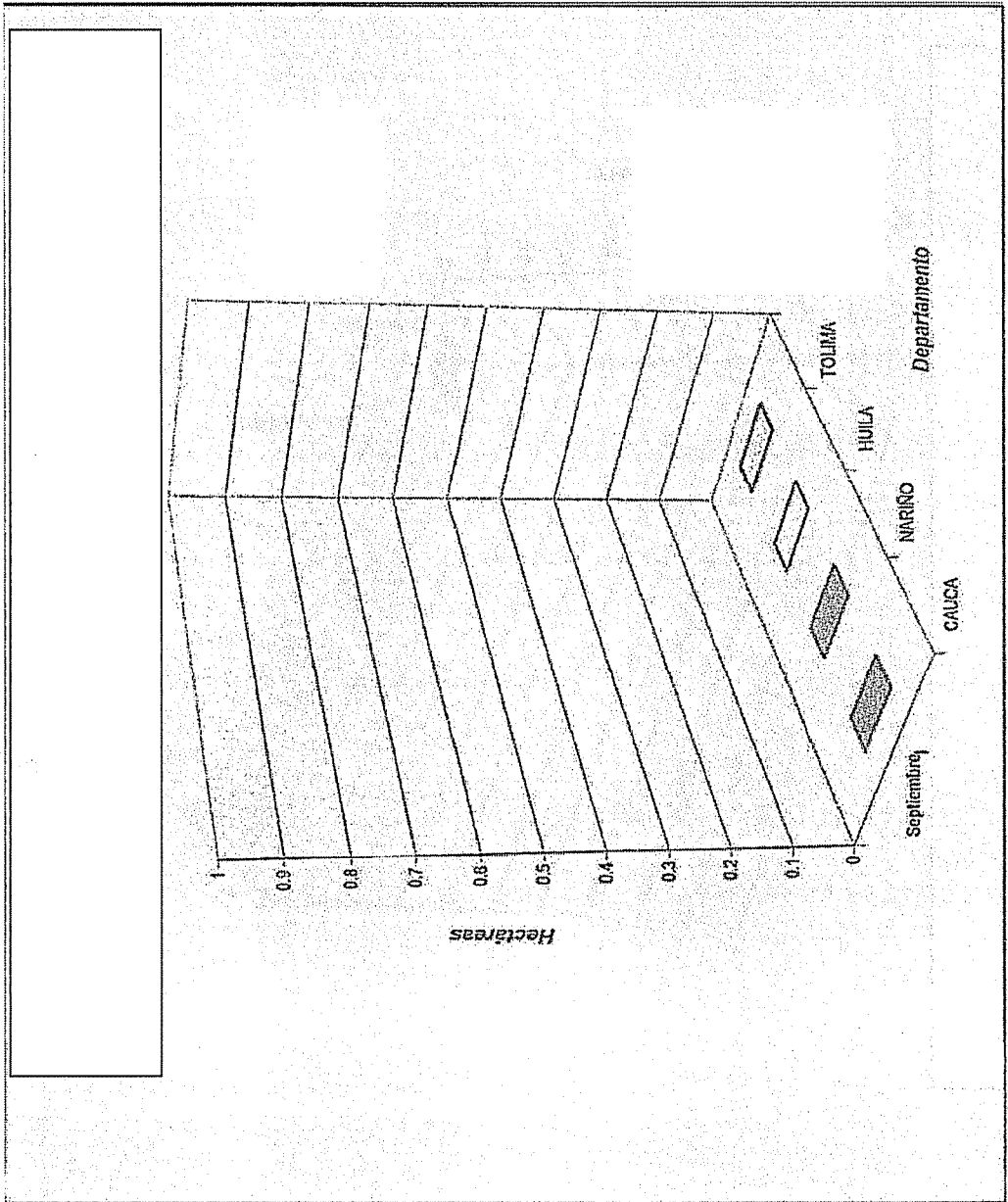
LITIOS



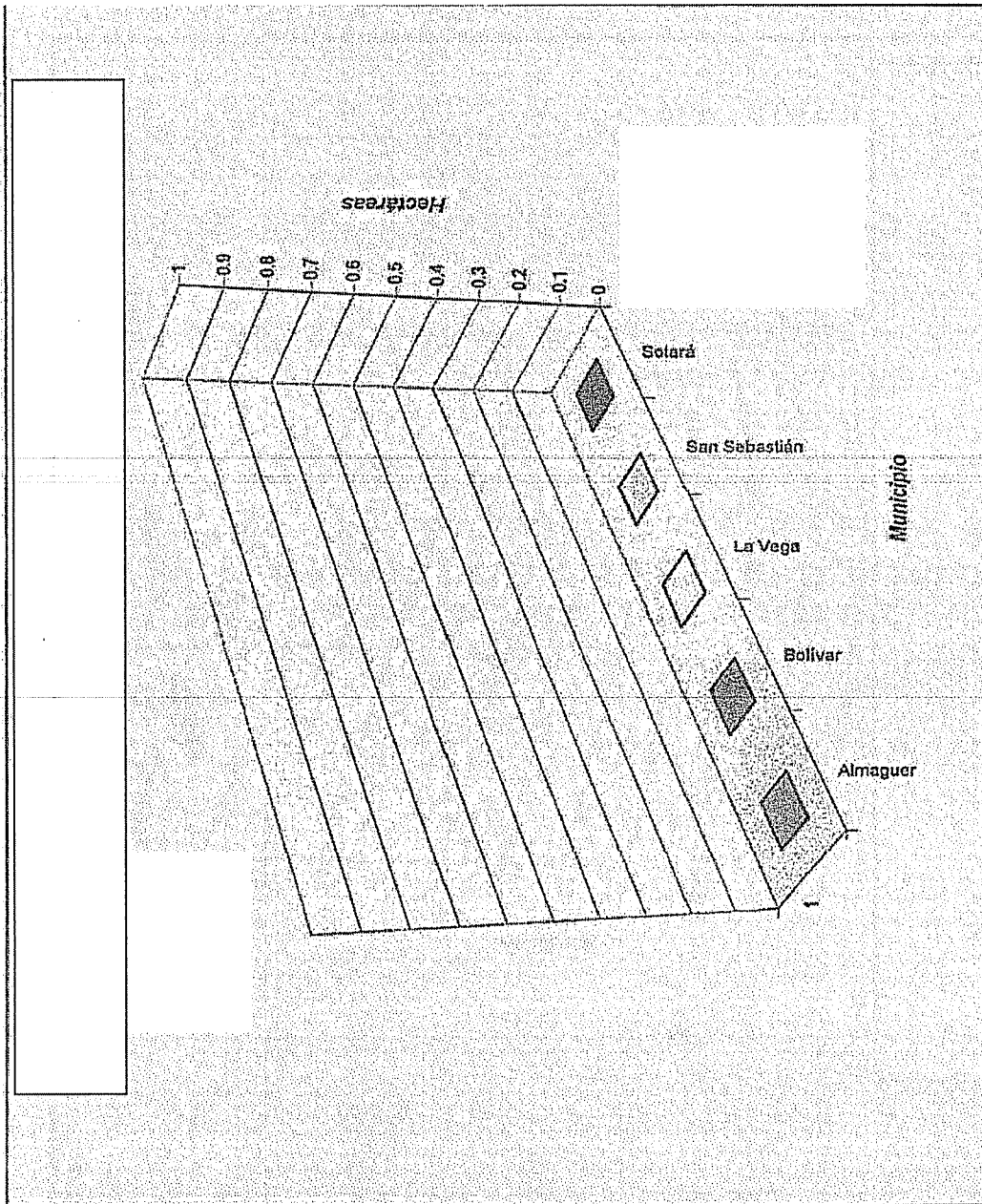
Municipio

Hectáreas

GRAPH 3.3



GRAPH 3.4



## 4 ENVIRONMENTAL IMPACT

Based on field investigations conducted under the Verification Protocol, the following aspects were observed:

### **Norte de Santander Nucleus (La Gabarra)**

It is important to point out the great labor force available for this nucleus of illicit crops. The wide availability of labor was a major factor for this nucleus to be reactivated very quickly, since a high rate of replanting and selective pruning was observed in areas sprayed with glyphosate in May of this year.

The coca crops themselves could even be defined as a biomarker, since it is observed that the effect of glyphosate on soil is not residual and does not interfere with the fertility of the soil, given that these farmers use the areas sprayed with glyphosate to develop new coca crops. Another aspect observed was the invasion of grasses and lower vegetation on the plots that were abandoned on account of the Eradication Program.

Only two cases showed damage to surrounding vegetation by the action of aerial spraying with glyphosate.

The fact that illicit crop growers continue cultivating their crops in the same places is an environmentally favorable factor since the clearing of new areas is greatly reduced, aiding in the retention of natural forest areas.

### **Meta Guaviare Nucleus**

Likewise, at the Puerto Rico Nucleus coca crops persist in the same sites that are the target of the Eradication Program. This action is reinforced by the continuing attacks on the National Police aircraft when performing their control tasks, actions that do not allow an on-going work in the area.

Especially in the north of Guaviare, there is a consolidation of livestock activity and many of the areas previously sprayed with glyphosate are abandoned and in the process of weed growth or consolidating to develop extensive cattle raising activities.

### **Caquetá, Cauca- Putumayo Nucleus**

In the southern Caquetá and northern Putumayo area it was observed that a high percentage of sprayed coca crops have been abandoned and are in a process of natural intensive revegetation. Also the area with new coca crops does not exceed five hectares, indicating that the action of the Eradication Program is persuading farmers to limit the extent of these and place them in a much more dispersed manner.

In the Piñuña area, south of Putumayo, there was no evidence of damage to vegetation adjacent to the illicit coca crops sprayed, and there was a very small area of subsistence crops.

## 5 RECOMMENDATIONS

Based on comments and evaluations of members participating in the Verification Commission, the following are the recommendations to achieve optimal development in future activities of the Verification Protocol;

- In preparation of the activities, all aspects of logistics, safety, travel time and travel distance, availability of participating officials and other contingencies involved in this kind of mission must be taken into account.
- The identification of the size and the sampling sites should be made weeks in advance due to the burdensomeness of the process and the time required.
- There should be additional sampling points, in cases where they would need to be modified, either by weather or security conditions.
- The Anti-Narcotics Police where possible, should ensure that the crews that are assigned stay during the entire development of the verification process.



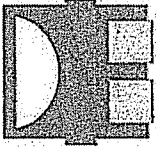


**Annex 41-C**

**ENVIRONMENTAL AUDIT ON THE ERADICATION OF ILLICIT CROPS, REPORT ON  
ACTIVITIES, *PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING  
WITH GLYPHOSATE*. PERIOD 10 NOVEMBER TO 9 DECEMBER 2003, 18 DECEMBER 2003**

*(Archives of the Colombian Foreign Ministry)*





Ministry of Interior and Justice

NATIONAL NARCOTICS DIRECTORATE  
Special Administrative Unit

PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL  
SPRAYING WITH GLYPHOSATE

PERIOD NOVEMBER 10-DECEMBER 9, 2003

ENVIRONMENTAL AUDIT OF THE PROGRAM FOR THE ERADICATION OF  
ILLICIT CROPS

Bogotá, December 18, 2003

Bogotá D.C., 18 December 2003

Mr. ALFONSO PLAZAS VEGA

Director

National Narcotics Directorate

Bogota

REF: Contract 040/03

Dear Mr. Plazas,

I hereby submit the Activity Report in the Environmental Audit, in the follow up for the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate.

The report contains activities undertaken between November 10 and December 9, 2003.

Yours sincerely

[Signed]

Jairo Ernesto Perez

Environmental Auditor, Program for the Eradication of Illicit Crops

Enclosure: Magnetic file



## **INTRODUCTION**

This document is the report for the Environmental Audit for follow up activities in the Program for the Eradication of Illicit Crops by Aerial Spraying during the period November 1-November 30, 2003.

## **CONTENTS**

### **1. AUDIT OF ENVIRONMENTAL SITUATION**

### **2. AUDIT OF THE DEVELOPMENT OF PROGRAMMES AND PROCEDURES IN PECIG**

#### **2.1. SUMMARY OF SPRAYING ACTIVITIES**

### **3. EVALUATION OF ENVIRONMENTAL MANAGEMENT AND CONTROL OF PECIG**

### **4. REFERENCE DOCUMENTATION, EVIDENCE AND ATTACHMENTS**

### **5. RECOMMENDATIONS**

### **6. SUMMARY**

### **7. SCHEDULES (ENVIRONMENTAL MANAGEMENT PLAN FORMS).**

## **1. AUDIT OF THE ENVIRONMENTAL SITUATION**

### **Verification Protocol for 2003**

Between November 11 and 26, 2003, verifications were conducted of the illicit coca crops sprayed in the provinces of Nariño, Putumayo, Guaviare, Arauca, Norte de Santander and Antioquia, between January and October, 2003.

The verification was attended by officials from the Ministry of the Environment, Housing and Regional Development, ICA, NAS, the Anti-Narcotics Police, and the National Narcotics Directorate-Environmental Audit.

The field verification comprised the evaluation of two points:

- The effectiveness of aerial spraying with glyphosate herbicide
- Environmental evaluation (observation of possible damage generated by aerial spraying on vegetation adjoining the coca plots, determination of the status of revegetalization of the plots sprayed, evaluation of possible damage to the licit crops, determination of the presence of constructions in the coca crops).

### **Evaluation of the effectiveness of aerial spraying with glyphosate herbicide.**

The points to be verified were selected at random from the database in the records of each of the spraying lines for the period between January and October 2003. Subsequently, the selection was further filtered based on the following criteria:

- Distance to the base of operations (no more than 50 miles)
- Representative nature of the nuclei sprayed
- Concentration of coca crops
- Security considerations and public order in the areas selected



The effectiveness of aerial spraying was determined based on the AL AM1 scale, the scale of values in which the total death of the plant is classed as 100% (excellent), and no effect as 0% (none, or poor).

Evaluators made aerial observations by low-altitude helicopter overflights. In some places, they came down to the ground in order to adjust reference levels. At the end of each day's work, the expert team had a meeting to exchange opinions and to give their evaluations.

In the tables "evaluation aerial spraying of illicit coca crops", there are two columns: in the first (EC), there is the evaluation of overall control of the plot and field effectiveness, and the second column (EP), refers to the effectiveness of the spraying passes or lines. It is clarified that although on most plots, coca crops were observed to be in production or living, the overall control of the plot was qualified as very good, since the grower had to replant the crop due to the effects of application, and if he had pruned the plants, leaf production would have been delayed by at least four months.

Each of the sites verified has a photographic record (digital format).

At nationwide level, the following percentages were established for the effectiveness of aerial spraying with the herbicide differs eight:

- **Arithmetical average: 89.8%**
- **Weighted average: 90.4%**

The 90.4% figure only reflects the degree of control of spraying passes over the coca crop, or the effect of damage or death which was caused by the herbicide glyphosate to the coca plants.

This percentage is not an indicator of the area eradicated: it presents a situation that although the coca crop was eradicated or died, in terms of time (weeks or months), coca was replanted in the same area.

General observations by nucleus

### **Nariño nucleus**

- 16 sites were verified.
- Effectiveness of aerial spraying: 89%
- A high percentage of plots sprayed were replanted. It is estimated that the percentage of replanting was 80-90%.
- The nucleus of the coca crops is expanding towards the north of the Province.
- Insignificant damage<sup>2</sup> was observed to vegetation adjoining the sprayed areas
- No licit crops were observed in the area verified.

### **Putumayo nucleus**

- 41 sites were verified.
- Effectiveness of aerial spraying: 87%
- In the municipality of Valle del Guamez, it was observed that there was good control of the coca crops, with remnants observed to be less than 1 ha.
- In the areas sprayed with glyphosate herbicide, it was observed that maize and plantain crops had been planted.
- In the northern sector of the municipality of Orito, it was observed that there had been an increase in coca crops, and restoration of the same
- and the percentage of replanted is estimated at 50%.
- No significant damage was observed to vegetation adjoining the areas sprayed.
- Soil samples were collected in order to determine the concentration of glyphosate residues.

### **Guaviare nucleus**

- 45 sites were verified.
- Effectiveness of aerial spraying: 93%
- It was observed that the coca crops had been relatively well controlled in the municipality of San José de Guaviare, El Retorno and Calamar. The extent of the coca plantations was on average less than 2 ha, and remnants of scattered remnants of woodland were found inside them.
- A high percentage of the areas sprayed in the first half of the year were replanted. It is estimated that this was done at a level of 70-80%.

- It was observed that the smaller the crop size, the greater possibility of it being replanted or reactivated after spraying.
- The municipality of Miraflores, which contains the largest nucleus of coca crops in the Province of Guaviare, was not verified, due to public order factors.
- No significant damage was observed to vegetation adjoining the sprayed areas.
- It was observed that there was a small of legal crops adjoining the coca plots sprayed.
- Soil samples were collected to determine the level of residues of glyphosate.

### **Arauca nucleus**

- 17 sites were written verified.
- Effectiveness of aerial spraying: 91%
- In the 17 sites verified (100%, it was observed that there were coca crops mixed or interspersed with plantain or maize plants.
- Insignificant damage was observed to adjoining vegetation adjoining the sprayed areas.
- Two months after spraying the coca plots, there was evidence of activity to reactivate the crops.

### **Norte de Santander nucleus**

- 30 sites were verified.
- Effectiveness of aerial spraying: 90%
- In the northern area of the municipality of Tibú, it was observed that the control of coca crops was good.
- Trend towards the displacement of coca crops to the south of the nucleus.
- The replanting percentage is estimated at 60-70%.
- In some places, it was observed that there was damage to the vegetation adjoining the sprayed areas.

### **Antioquia nucleus**

- 31 sites were checked
- Effectiveness of aerial spraying: 89%
- It is estimated that 75-80% of the plots sprayed were replanted.

- No significant damage was observed to vegetation adjoining the sprayed areas
- The installation of coca leaf crops in hilly or mountainous areas is a factor which favours erosive processes (washing, slippage, landslide). In addition, the growers control surface vegetation, leaving the soil practically without vegetation cover.

### **Factors affecting the efficiency of PECIG.**

Although effectiveness of aerial spraying is good, there are factors that affect eradication of illicit crops and the desired results from an overall point of view.

This is due to factors external to PECIG, or strategies used by the growers, such as the following:

- A high percentage of replanting in coca plots that were sprayed. In real terms, between three and six months after spraying, the coca plots can be reactivated.
- Pruning is a strategy which disturbs the process of complete eradication, although it is not a very common practice.
- Availability of seedling and production of plantlets on a permanent basis. A few weeks after spraying campaign, the plots were replanted, due to availability of coca plantlets. It should be remembered that the coca plant has two forms a reproduction, namely sexual (seeds), and vegetative (grafting), a factor which allows the growers to renew the relegated crop easily. The strategies are being used particularly in Antioquia and Nariño.
- The permanent attacks on aircraft, and the accidents that have occurred have reduced the amount of equipment available to maintain a constant pace of work, and therefore, maintain control over the coca and the nucleus is sprayed once every six months, which is sufficient time for the growers to take another harvest and to reduce the economic losses and have funds available to replace the crop eradicated.
- Problems of public order have also forced reduction in the number of missions and days worked. The transfer of troops to operating areas or operating restrictions on certain parts of the country has reduced the period pace of work markedly. It is estimated that by mid 2003, the illicit crops area had been reduced by 50%. Due to the factors mentioned, however, by the end of the year the situation changed, and

the area of crops was again on the increase. In global terms, the overall reduction was only 20-30% in coca areas.

- Poor atmospheric conditions reduced productivity because the equipment was grounded.
- Partial spraying of a plot, a strategy used by the PECIG, allows the growers to prune the area affected rapidly, along with the sector which was not sprayed. This situation means that there is no effective working area (foliage area), when the aircraft passes over again.
- It is advisable to evaluate the system of measurement of illicit crops as well as calculation to measure areas sprayed, in order to correlate the two variables.

In the following tables we show the location of points verified, spraying dates, and the classification is given by the evaluators of the NAS, Minister of Environment, Housing and Regional Development, ICA, Environmental Audit-National Narcotics Directorate, and the Antinarcotics Police. The evaluations of the effectiveness of spraying and the control of the plots have been broken down by Province.

Further details will be presented of the observations obtained from each of the sites verified, and the evaluation of the effectiveness of spraying and the effects on the environment in a further report. Comments and observations will be supported by the related photographic records.

VERIFIED SITES FROM 1 JANUARY TO 31 OCTOBER

2003

| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE |
|-----|-----|----------|-----------|-------------|---------------|-------------------|----------|
| 1   | 124 | 2 02 29  | -78 30 35 | J0936%AC    | 09-oct-03     | 13-nov-03         | Nariño   |
| 2   | 125 | 2 03 36  | -78 29 52 | D24306AC    | 24-abr-03     | 13-nov-03         | Nariño   |
| 3   | 126 | 2 02 12  | -78 28 56 | D1332CDC    | 13-abr-03     | 13-nov-03         | Nariño   |
| 4   | 127 | 2 01 29  | -78 29 47 | J0934EBC    | 09-oct-03     | 13-nov-03         | Nariño   |
| 5   | 128 | 1 59 57  | -78 28 37 | J0934EBC    | 09-oct-03     | 13-nov-03         | Nariño   |
| 6   | 129 | 1 51 13  | -78 26 11 | C2530BAC    | 25-mar-03     | 13-nov-03         | Nariño   |
| 7   | 130 | 1 50 27  | -78 24 16 | D06325AC    | 06-abr-03     | 13-nov-03         | Nariño   |
| 8   | 131 | 1 49 05  | -78 22 17 | C22316AC    | 22-mar-03     | 13-nov-03         | Nariño   |
| 9   | 249 | 1 44 13  | -78 27 58 | C15325AC    | 15-mar-03     | 13-nov-03         | Nariño   |
| 10  | 250 | 1 45 04  | -78 30 26 | C2530BAC    | 25-mar-03     | 13-nov-03         | Nariño   |
| 11  | 251 | 1 49 29  | -78 31 36 | C2533YAC    | 25-mar-03     | 13-nov-03         | Nariño   |
| 12  | 252 | 1 50 20  | -78 29 42 | B2030WDC    | 20-feb-03     | 13-nov-03         | Nariño   |
| 13  | 253 | 1 54 53  | -78 34 07 | I1634TBC    | 16-sep-03     | 13-nov-03         | Nariño   |
| 14  | 254 | 1 55 39  | -78 34 34 | I1634TAC    | 16-sep-03     | 13-nov-03         | Nariño   |
| 15  | 255 | 1 56 29  | -78 33 50 | I1634TBC    | 16-sep-03     | 13-nov-03         | Nariño   |
| 16  | 256 | 1 55 58  | -78 33 02 | I1634TCC    | 16-sep-03     | 13-nov-03         | Nariño   |
|     |     |          |           |             |               |                   |          |
| 1   | 49  | 0 27 21  | -76 44 58 | G093JZAC    | 09-jul-03     | 15-nov-03         | Putumayo |
| 2   | 50  | 0 24 57  | -76 47 12 | G053CWDC    | 05-jul-03     | 15-nov-03         | Putumayo |
| 3   | 51  | 0 21 53  | -76 47 12 | G053CWDC    | 05-jul-03     | 14-nov-03         | Putumayo |
| 4   | 52  | 0 20 59  | -76 50 02 | E233ADAC    | 23-may-03     | 14-nov-03         | Putumayo |
| 5   | 53  | 0 26 02  | -76 55 18 | G063JFDC    | 06-jul-03     | 14-nov-03         | Putumayo |
| 6   | 54  | 0 27 02  | -76 55 35 | G063JFCC    | 06-jul-03     | 14-nov-03         | Putumayo |
| 7   | 55  | 0 28 36  | -76 55 23 | G063JFDC    | 06-jul-03     | 14-nov-03         | Putumayo |
| 8   | 61  | 0 28 30  | -76 49 15 | G023E1BC    | 02-jul-03     | 15-nov-03         | Putumayo |
| 9   | 154 | 0 24 19  | -76 52 01 | E233ADAC    | 23-may-03     | 14-nov-03         | Putumayo |
| 10  | 52  | 0 20 59  | -76 50 02 | E233ADAC    | 23-may-03     | 14-nov-03         | Putumayo |
| 11  | 150 | 0 24 43  | -76 44 12 | G093JZBC    | 09-jul-03     | 15-nov-03         | Putumayo |
| 12  | 151 | 0 21 36  | -76 44 37 | G093JZBC    | 09-jul-03     | 14-nov-03         | Putumayo |
| 13  | 152 | 0 24 07  | -76 48 27 | G043JFAC    | 04-jul-03     | 15-nov-03         | Putumayo |

| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE |
|-----|-----|----------|-----------|-------------|---------------|-------------------|----------|
| 14  | 153 | 0 20 42  | -76 48 27 | G043E1AC    | 04-jul-03     | 14-nov-03         | Putumayo |
| 15  | 155 | 0 20 07  | -76 52 33 | G163ABAC    | 16-jul-03     | 14-nov-03         | Putumayo |
| 16  | 156 | 0 21 03  | -76 53 26 | G142CJBC    | 14-jul-03     | 14-nov-03         | Putumayo |
| 17  | 157 | 0 22 45  | -76 53 46 | G123JZBC    | 12-jul-03     | 14-nov-03         | Putumayo |
| 18  | 158 | 0 26 19  | -76 53 37 | G143ABAC    | 14-jul-03     | 14-nov-03         | Putumayo |
| 19  | 159 | 0 24 07  | -76 53 26 | G143JDBC    | 14-jul-03     | 14-nov-03         | Putumayo |
| 20  | 160 | 0 24 26  | -76 54 44 | G103JJCC    | 10-jul-03     | 14-nov-03         | Putumayo |
| 21  | 161 | 0 27 56  | -76 54 28 | G103JJDC    | 10-jul-03     | 14-nov-03         | Putumayo |
| 22  | 45  | 0 39 19  | -76 49 38 | F183CBAC    | 18-jun-03     | 15-nov-03         | Putumayo |
| 23  | 47  | 0 32 48  | -76 47 01 | F303EWBC    | 30-jun-03     | 15-nov-03         | Putumayo |
| 24  | 48  | 0 30 08  | -76 47 22 | F303A#AC    | 30-jun-03     | 15-nov-03         | Putumayo |
| 25  | 56  | 0 29 40  | -76 55 21 | G063JFDC    | 06-jul-03     | 15-nov-03         | Putumayo |
| 26  | 57  | 0 31 48  | -76 55 23 | F233CD8C    | 23-jun-03     | 15-nov-03         | Putumayo |
| 27  | 58  | 0 32 12  | -76 59 50 | E233ADAC    | 23-may-03     | 15-nov-03         | Putumayo |
| 28  | 59  | 0 36 14  | -76 59 46 | E243ABAC    | 24-may-03     | 15-nov-03         | Putumayo |
| 29  | 60  | 0 37 38  | -76 59 35 | F063E#AC    | 06-jun-03     | 15-nov-03         | Putumayo |
| 30  | 149 | 0 38 20  | -76 49 30 | F243ABAC    | 24-jun-03     | 15-nov-03         | Putumayo |
| 31  | 46  | 0 39 22  | -76 48 46 | F243ABAC    | 24-jun-03     | 15-nov-03         | Putumayo |
| 32  | 145 | 0 35 10  | -76 48 48 | F243ABAC    | 24-jun-03     | 15-nov-03         | Putumayo |
| 33  | 146 | 0 38 34  | -76 47 43 | F163ADAC    | 16-jun-03     | 15-nov-03         | Putumayo |
| 34  | 147 | 0 31 58  | -76 49 28 | F243ABAC    | 24-jun-03     | 15-nov-03         | Putumayo |
| 35  | 148 | 0 34 23  | -76 47 43 | F163ADAC    | 16-jun-03     | 15-nov-03         | Putumayo |
| 36  | 162 | 0 30 17  | -76 54 52 | F273JFBC    | 27-jun-03     | 15-nov-03         | Putumayo |
| 37  | 163 | 0 35 13  | -76 58 15 | F223CZBC    | 22-jun-03     | 15-nov-03         | Putumayo |
| 38  | 164 | 0 36 21  | -76 55 57 | E213ABAC    | 21-may-03     | 15-nov-03         | Putumayo |
| 39  | 165 | 0 37 29  | -76 56 50 | F233ABAC    | 23-jun-03     | 15-nov-03         | Putumayo |
| 40  | 166 | 0 37 03  | -76 54 40 | F273JFBC    | 27-jun-03     | 15-nov-03         | Putumayo |
| 41  | 167 | 0 41 59  | -76 57 21 | E243ABAC    | 24-jun-03     | 15-nov-03         | Putumayo |
| 1   | 31  | 2 27 38  | -72 31 45 | D113RMAC    | 11-abr-03     | 17-nov-03         | Guaviare |
| 2   | 33  | 2 28 49  | -72 28 35 | D223IAC     | 22-abr-03     | 17-nov-03         | Guaviare |
| 3   | 34  | 2 34 01  | -72 29 39 | F053YGAC    | 05-jun-03     | 17-nov-03         | Guaviare |
| 4   | 35  | 2 17 12  | -72 32 52 | D013R7AC    | 01-abr-03     | 17-nov-03         | Guaviare |

| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE |
|-----|-----|----------|-----------|-------------|---------------|-------------------|----------|
| 5   | 37  | 2 07 20  | -72 32 17 | B173YHAC    | 17-feb-03     | 17-nov-03         | Guaviare |
| 6   | 42  | 2 30 39  | -72 29 56 | E1633SAC    | 16-may-03     | 17-nov-03         | Guaviare |
| 7   | 43  | 2 15 19  | -72 24 31 | E153XGAC    | 15-may-03     | 17-nov-03         | Guaviare |
| 8   | 44  | 2 17 24  | -72 54 03 | C10347AC    | 10-mar-03     | 17-nov-03         | Guaviare |
| 9   | 135 | 2 05 01  | -72 43 10 | C303IUAC    | 30-mar-03     | 17-nov-03         | Guaviare |
| 10  | 168 | 2 26 25  | -72 33 49 | C073XNAC    | 07-mar-03     | 17-nov-03         | Guaviare |
| 11  | 169 | 2 22 58  | -72 34 15 | D103YGAC    | 10-abr-03     | 17-nov-03         | Guaviare |
| 12  | 171 | 2 25 05  | -72 30 16 | A2534GBC    | 25-ene-03     | 17-nov-03         | Guaviare |
| 13  | 174 | 2 31 55  | -72 26 28 | G0831SAC    | 08-jun-03     | 17-nov-03         | Guaviare |
| 14  | 175 | 2 29 16  | -72 25 29 | E1433SAC    | 14-may-03     | 17-nov-03         | Guaviare |
| 15  | 177 | 2 27 06  | -72 27 51 | D2131SAC    | 21-abr-03     | 17-nov-03         | Guaviare |
| 16  | 178 | 2 36 10  | -72 24 43 | G083UMAC    | 08-jun-03     | 17-nov-03         | Guaviare |
| 17  | 179 | 2 33 13  | -72 24 35 | G083WHAC    | 08-jun-03     | 17-nov-03         | Guaviare |
| 18  | 180 | 2 26 15  | -72 23 37 | D2231SAC    | 22-abr-03     | 17-nov-03         | Guaviare |
| 19  | 182 | 2 23 06  | -72 30 28 | C173UMAC    | 17-mar-03     | 17-nov-03         | Guaviare |
| 20  | 183 | 2 21 09  | -72 32 42 | D1131SAC    | 11-abr-03     | 17-nov-03         | Guaviare |
| 21  | 185 | 2 13 19  | -72 37 12 | E163YGAC    | 16-may-03     | 17-nov-03         | Guaviare |
| 22  | 186 | 2 13 15  | -72 31 30 | C073S8BC    | 07-mar-03     | 17-nov-03         | Guaviare |
| 23  | 187 | 2 14 21  | -72 25 44 | B0731+AC    | 07-feb-03     | 17-nov-03         | Guaviare |
| 24  | 188 | 2 11 29  | -72 25 13 | C073XNBC    | 07-mar-03     | 17-nov-03         | Guaviare |
| 25  | 189 | 2 12 07  | -72 28 31 | E043UNAC    | 04-may-03     | 17-nov-03         | Guaviare |
| 26  | 190 | 2 10 17  | -72 31 47 | B203QGAC    | 20-feb-03     | 17-nov-03         | Guaviare |
| 27  | 191 | 2 08 58  | -72 33 38 | A2931GBC    | 29-ene-03     | 17-nov-03         | Guaviare |
| 28  | 192 | 2 08 07  | -72 34 56 | B263XNAC    | 28-feb-03     | 17-nov-03         | Guaviare |
| 29  | 193 | 2 04 16  | -72 37 04 | C293U7AC    | 29-mar-03     | 17-nov-03         | Guaviare |
| 30  | 194 | 2 00 35  | -72 30 37 | A293YSBC    | 29-ene-03     | 17-nov-03         | Guaviare |
| 31  | 196 | 2 01 38  | -72 32 09 | B28338AC    | 28-feb-03     | 17-nov-03         | Guaviare |
| 32  | 197 | 2 01 43  | -72 33 41 | C293I9AC    | 29-mar-03     | 17-nov-03         | Guaviare |
| 33  | 198 | 2 04 08  | -72 35 12 | B1733AAC    | 17-feb-03     | 17-nov-03         | Guaviare |
| 34  | 199 | 2 01 52  | -72 36 25 | C303RNAC    | 30-mar-03     | 17-nov-03         | Guaviare |
| 35  | 206 | 2 07 05  | -72 42 24 | B063Y8BC    | 06-feb-03     | 17-nov-03         | Guaviare |
| 36  | 207 | 2 06 07  | -72 41 00 | G1033MAC    | 10-jun-03     | 17-nov-03         | Guaviare |
| 37  | 208 | 2 06 15  | -72 39 33 | F243UNAC    | 24-jun-03     | 17-nov-03         | Guaviare |
| 38  | 209 | 2 04 26  | -72 39 31 | F243R8AC    | 24-jun-03     | 17-nov-03         | Guaviare |



| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE           |
|-----|-----|----------|-----------|-------------|---------------|-------------------|--------------------|
| 39  | 216 | 2 36 04  | -72 20 53 | H1231SAC    | 12-ago-03     | 17-nov-03         | Guaviare           |
| 40  | 217 | 2 24 17  | -72 32 09 | C073XNAC    | 07-mar-03     | 17-nov-03         | Guaviare           |
| 41  | 218 | 2 38 18  | -72 22 48 | H0431SAC    | 04-ago-03     | 17-nov-03         | Guaviare           |
| 42  | 219 | 2 18 38  | -72 50 08 | C133Y2BC    | 13-mar-03     | 17-nov-03         | Guaviare           |
| 43  | 220 | 2 14 44  | -72 51 36 | A233X2BC    | 23-ene-03     | 17-nov-03         | Guaviare           |
| 44  | 221 | 2 22 06  | -72 56 55 | A123Q+AC    | 12-ene-03     | 17-nov-03         | Guaviare           |
| 45  | 222 | 2 22 06  | -72 58 46 | A123Q+AC    | 12-ene-03     | 17-nov-03         | Guaviare           |
| 1   | 76  | 6 40 20  | -71 37 53 | I193J1AC    | 19-sep-03     | 19-nov-03         | Arauca             |
| 2   | 77  | 6 41 12  | -71 37 43 | I193J1AC    | 19-sep-03     | 19-nov-03         | Arauca             |
| 3   | 78  | 6 41 02  | -71 39 08 | I213J1AC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 4   | 79  | 6 42 17  | -71 39 16 | I203J1BC    | 20-sep-03     | 19-nov-03         | Arauca             |
| 5   | 80  | 6 42 46  | -71 38 03 | I193J1AC    | 19-sep-03     | 19-nov-03         | Arauca             |
| 6   | 81  | 6 43 07  | -71 38 56 | I193J1AC    | 19-sep-03     | 19-nov-03         | Arauca             |
| 7   | 82  | 6 44 11  | -71 37 11 | I193J1AC    | 19-sep-03     | 19-nov-03         | Arauca             |
| 8   | 83  | 6 45 23  | -71 38 59 | I213J1AC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 9   | 84  | 6 46 26  | -71 37 33 | I213A#AC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 10  | 85  | 6 47 51  | -71 38 19 | I213J1AC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 11  | 86  | 6 48 40  | -71 37 40 | I213J1AC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 12  | 88  | 6 49 47  | -71 36 59 | I213A#CC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 13  | 89  | 6 49 36  | -71 34 39 | I213J1BC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 14  | 90  | 6 48 27  | -71 32 39 | I213J1CC    | 21-sep-03     | 19-nov-03         | Arauca             |
| 15  | 91  | 6 48 42  | -71 31 15 | I293EFBC    | 29-sep-03     | 19-nov-03         | Arauca             |
| 16  | 92  | 6 47 23  | -71 32 15 | I253EFBC    | 25-sep-03     | 19-nov-03         | Arauca             |
| 17  | 93  | 6 46 53  | -71 31 06 | I293EFBC    | 29-sep-03     | 19-nov-03         | Arauca             |
| 1   | 1   | 8 19 22  | -72 51 28 | A143A1BC    | 14-ene-03     | 22-nov-03         | Norte de Santander |
| 2   | 2   | 8 20 46  | -72 51 26 | A143A1BC    | 14-ene-03     | 22-nov-03         | Norte de Santander |
| 3   | 4   | 8 50 55  | -72 52 45 | I163Y BC    | 16-sep-03     | 20-nov-03         | Norte de Santander |
| 4   | 7   | 8 54 06  | -72 54 13 | B213KDAC    | 21-feb-03     | 20-nov-03         | Norte de Santander |
| 5   | 11  | 8 51 34  | -72 45 51 | B223EJBC    | 22-feb-03     | 20-nov-03         | Norte de Santander |
| 6   | 227 | 8 22 08  | -72 51 28 | A153A1CC    | 15-ene-03     | 22-nov-03         | Norte de Santander |
| 7   | 260 | 8 51 43  | -72 54 13 | B223EJAC    | 22-feb-03     | 20-nov-03         | Norte de Santander |

| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE           |
|-----|-----|----------|-----------|-------------|---------------|-------------------|--------------------|
| 8   | 264 | 8 57 46  | -72 53 12 | B223KDAC    | 22-feb-03     | 20-nov-03         | Norte de Santander |
| 9   | 265 | 8 54 22  | -72 45 08 | B223KDBC    | 22-feb-03     | 20-nov-03         | Norte de Santander |
| 10  | 3   | 8 22 35  | -72 51 08 | A153A1CC    | 15-ene-03     | 22-nov-03         | Norte de Santander |
| 11  | 5   | 8 51 23  | -72 51 12 | B223E1AC    | 22-feb-03     | 20-nov-03         | Norte de Santander |
| 12  | 224 | 8 20 12  | -72 52 42 | A153E3CC    | 15-ene-03     | 22-nov-03         | Norte de Santander |
| 13  | 225 | 8 21 17  | -72 52 44 | A153E3CC    | 15-ene-03     | 22-nov-03         | Norte de Santander |
| 14  | 229 | 8 24 29  | -72 45 08 | A133E3BC    | 13-ene-03     | 22-nov-03         | Norte de Santander |
| 15  | 230 | 8 25 43  | -72 43 57 | A133A1BC    | 13-ene-03     | 22-nov-03         | Norte de Santander |
| 16  | 231 | 8 25 19  | -72 44 50 | A143E3AC    | 14-ene-03     | 22-nov-03         | Norte de Santander |
| 17  | 232 | 8 25 10  | -72 43 05 | I253UGAC    | 25-sep-03     | 22-nov-03         | Norte de Santander |
| 18  | 233 | 8 23 08  | -72 43 17 | I253ISAC    | 25-sep-03     | 22-nov-03         | Norte de Santander |
| 19  | 235 | 8 21 38  | -72 42 59 | A133A1AC    | 13-ene-03     | 22-nov-03         | Norte de Santander |
| 20  | 236 | 8 22 24  | -72 45 05 | A133J#AC    | 13-ene-03     | 22-nov-03         | Norte de Santander |
| 21  | 237 | 8 18 45  | -72 41 47 | I263ISAC    | 26-sep-03     | 22-nov-03         | Norte de Santander |
| 22  | 238 | 8 16 10  | -72 40 05 | I253UGBC    | 25-sep-03     | 22-nov-03         | Norte de Santander |
| 23  | 239 | 8 14 14  | -72 39 31 | I1333LDC    | 13-sep-03     | 22-nov-03         | Norte de Santander |
| 24  | 240 | 8 24 00  | -72 49 32 | A133KFAC    | 13-ene-03     | 22-nov-03         | Norte de Santander |
| 25  | 241 | 8 24 56  | -72 51 11 | A143KFBC    | 14-ene-03     | 22-nov-03         | Norte de Santander |
| 26  | 242 | 8 24 45  | -72 52 27 | A143KFBC    | 14-ene-03     | 22-nov-03         | Norte de Santander |
| 27  | 259 | 8 52 50  | -72 52 07 | B253E1AC    | 25-feb-03     | 20-nov-03         | Norte de Santander |
| 28  | 262 | 8 58 29  | -72 51 06 | B253KDAC    | 25-feb-03     | 20-nov-03         | Norte de Santander |
| 29  | 263 | 8 59 32  | -72 49 31 | I293UHBC    | 29-sep-03     | 20-nov-03         | Norte de Santander |
| 30  | 261 | 8 56 43  | -72 53 46 | A253A=AC    | 25-ene-03     | 20-nov-03         | Norte de Santander |
| 1   | 14  | 7 44 34  | -75 39 23 | H1636\$BC   | 16-ago-03     | 25-nov-03         | Antioquia          |
| 2   | 16  | 7 40 53  | -75 37 34 | H06346AC    | 06-ago-03     | 25-nov-03         | Antioquia          |
| 3   | 17  | 7 39 03  | -75 37 27 | H1037HAC    | 10-ago-03     | 25-nov-03         | Antioquia          |
| 4   | 18  | 7 38 03  | -75 37 18 | H06315AC    | 06-ago-03     | 25-nov-03         | Antioquia          |
| 5   | 19  | 7 36 56  | -75 35 20 | H0734HAC    | 07-ago-03     | 25-nov-03         | Antioquia          |
| 6   | 21  | 7 33 12  | -75 36 05 | H1734TAC    | 17-ago-03     | 25-nov-03         | Antioquia          |
| 7   | 22  | 7 32 16  | -75 25 20 | G2130HCC    | 21-jul-03     | 25-nov-03         | Antioquia          |
| 8   | 25  | 7 27 37  | -75 15 40 | G1734HCC    | 17-jul-03     | 25-nov-03         | Antioquia          |
| 9   | 27  | 7 33 32  | -75 14 18 | G1434HAC    | 14-jul-03     | 25-nov-03         | Antioquia          |

| No. | ID  | LATITUDE | LONGITUDE | FLIGHT CODE | SPRAYING DATE | VERIFICATION DATE | PROVINCE  |
|-----|-----|----------|-----------|-------------|---------------|-------------------|-----------|
| 10  | 28  | 7 38.13  | -75 08.49 | H2334VAC    | 23-ago-03     | 25-nov-03         | Antioquia |
| 11  | 99  | 7 41.39  | -75 39.13 | H1837ECC    | 18-ago-03     | 25-nov-03         | Antioquia |
| 12  | 112 | 7 24.13  | -75 22.00 | G26345BC    | 26-jul-03     | 25-nov-03         | Antioquia |
| 13  | 114 | 7 22.05  | -75 15.23 | G1931YAC    | 19-jul-03     | 25-nov-03         | Antioquia |
| 14  | 15  | 7 44.36  | -75 38.08 | H1837ECC    | 18-ago-03     | 25-nov-03         | Antioquia |
| 15  | 23  | 7 23.34  | -75 20.08 | G26345BC    | 26-jul-03     | 25-nov-03         | Antioquia |
| 16  | 100 | 7 41.03  | -75 35.51 | H07346BC    | 07-ago-03     | 25-nov-03         | Antioquia |
| 17  | 103 | 7 38.26  | -75 35.42 | H0831EBC    | 08-ago-03     | 25-nov-03         | Antioquia |
| 18  | 104 | 7 35.54  | -75 36.28 | H0831ECC    | 08-ago-03     | 25-nov-03         | Antioquia |
| 19  | 105 | 7 35.14  | -75 35.39 | H1536IAC    | 15-ago-03     | 25-nov-03         | Antioquia |
| 20  | 107 | 7 34.36  | -75 32.55 | H04315BC    | 04-ago-03     | 25-nov-03         | Antioquia |
| 21  | 108 | 7 33.04  | -75 34.49 | H1736IAC    | 17-ago-03     | 25-nov-03         | Antioquia |
| 22  | 109 | 7 32.43  | -75 28.22 | G28346BC    | 28-jul-03     | 25-nov-03         | Antioquia |
| 23  | 110 | 7 30.25  | -75 27.01 | G3130VAC    | 31-jul-03     | 25-nov-03         | Antioquia |
| 24  | 111 | 7 28.59  | -75 23.26 | G24345BC    | 24-jul-03     | 25-nov-03         | Antioquia |
| 25  | 113 | 7 22.13  | -75 18.56 | G21306AC    | 21-jul-03     | 25-nov-03         | Antioquia |
| 26  | 115 | 7 29.46  | -75 18.57 | G2330VBC    | 23-jul-03     | 25-nov-03         | Antioquia |
| 27  | 116 | 7 29.40  | -75 16.12 | G1634EAC    | 16-jul-03     | 25-nov-03         | Antioquia |
| 28  | 117 | 7 32.19  | -75 16.08 | G1434HCC    | 14-jul-03     | 25-nov-03         | Antioquia |
| 29  | 118 | 7 32.39  | -75 15.21 | G1734HBC    | 17-jul-03     | 25-nov-03         | Antioquia |
| 30  | 119 | 7 33.45  | -75 12.04 | G2031TBC    | 20-jul-03     | 25-nov-03         | Antioquia |
| 31  | 120 | 7 36.38  | -75 04.57 | H28365AC    | 28-ago-03     | 25-nov-03         | Antioquia |

Source: Dynacorp

EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS  
 NARIÑO PROVINCE NUCLEUS  
 PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| SITE No.                         | RATE (%) 12 NOVEMBER 2003 |     |     |             |     |     |     |    |    |             |    |     | AVERAGE (%) |     |    |    |    |
|----------------------------------|---------------------------|-----|-----|-------------|-----|-----|-----|----|----|-------------|----|-----|-------------|-----|----|----|----|
|                                  | NAS                       |     |     | MINAMBIENTE |     |     | ICA |    |    | AUDITOR DNE |    |     | DIRAN       |     |    | EC | EP |
|                                  | EC                        | EP  |     | EC          | EP  |     | EC  | EP |    | EC          | EP |     | EC          | EP  |    |    |    |
| 253                              | 80                        | 80  | 90  | 90          | 90  | 100 | 95  | 90 | 90 | 90          | 90 | 90  | 90          | 100 | 90 | 92 |    |
| 254                              | 90                        | 100 | 90  | 95          | 90  | 80  | 70  | 80 | 80 | 70          | 80 | 70  | 80          | 100 | 80 | 89 |    |
| 255                              | 70                        | 70  | 80  | 80          | 80  | 90  | 90  | 90 | 90 | 80          | 80 | 80  | 80          | 90  | 82 | 82 |    |
| 256                              | 80                        | 95  | 100 | 90          | 90  | 95  | 90  | 90 | 90 | 90          | 90 | 100 | 100         | 100 | 92 | 94 |    |
| CALIFICACION (%) 13 DE NOVIEMBRE |                           |     |     |             |     |     |     |    |    |             |    |     |             |     |    |    |    |
| 124                              | 80                        | 100 | 90  | 90          | 90  | 100 | 90  | 90 | 90 | 90          | 90 | 90  | 90          | 100 | 90 | 96 |    |
| 125                              | 70                        | 90  | 70  | 80          | 80  | 90  | 80  | 80 | 30 | 70          | 70 | 80  | 80          | 80  | 68 | 82 |    |
| 126                              | 100                       | 100 | 85  | 80          | 80  | 80  | 80  | 80 | 80 | 80          | 80 | 100 | 100         | 100 | 89 | 88 |    |
| 127                              | 95                        | 95  | 95  | 95          | 95  | 100 | 90  | 80 | 80 | 90          | 90 | 90  | 90          | 70  | 90 | 90 |    |
| 128                              | 100                       | 100 | 100 | 100         | 100 | 100 | 100 | 0  | 0  | 0           | 0  | 100 | 100         | 100 | 80 | 80 |    |
| 129                              | 95                        | 95  | 90  | 90          | 90  | 100 | 90  | 80 | 80 | 95          | 80 | 80  | 80          | 80  | 87 | 92 |    |
| 130                              | 95                        | 100 | 95  | 95          | 95  | 100 | 80  | 80 | 40 | 90          | 90 | 90  | 70          | 80  | 80 | 91 |    |
| 131                              | 90                        | 100 | 80  | 70          | 80  | 80  | 80  | 80 | 80 | 95          | 90 | 90  | 80          | 80  | 84 | 85 |    |
| 249                              | 95                        | 100 | 95  | 95          | 95  | 100 | 90  | 90 | 70 | 70          | 70 | 90  | 100         | 88  | 93 |    |    |
| 250                              | 95                        | 100 | 80  | 80          | 80  | 90  | 90  | 70 | 70 | 90          | 90 | 90  | 90          | 90  | 85 | 90 |    |
| 251                              | 90                        | 90  | 95  | 90          | 90  | 100 | 90  | 70 | 70 | 90          | 90 | 90  | 80          | 80  | 87 | 90 |    |
| 252                              | 85                        | 95  | 90  | 90          | 90  | 90  | 90  | 70 | 70 | 90          | 90 | 90  | 80          | 80  | 85 | 89 |    |
| AVERAGE                          | 88                        | 94  | 89  | 88          | 87  | 93  | 70  | 80 | 70 | 80          | 90 | 90  | 89          | 85  | 85 | 89 |    |

EC = FIELD EFFECTIVENESS  
 EP = PASSAGE EFFECTIVENESS

EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS  
 PUYUMAYO PROVINCE NUCLEUS  
 PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| SITE No.             | RATE (%) 14 NOVEMBER 2003 |     |     |     |             |     |     |     |             |     |     |     | AVERAGE (%) |     |    |    |    |    |
|----------------------|---------------------------|-----|-----|-----|-------------|-----|-----|-----|-------------|-----|-----|-----|-------------|-----|----|----|----|----|
|                      | NAS                       |     |     |     | MINAMBIENTE |     |     |     | AUDITOR DNE |     |     |     | DIRAN       |     |    |    | EP | EC |
|                      | EG                        | EP  | EP  | EP  | EG          | EP  | EP  | EP  | EG          | EP  | EP  | EP  | EG          | EP  | EP | EP |    |    |
| 55                   | 90                        | 100 | 85  | 95  | 95          | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 100 | 94 | 96 |    |    |
| 161                  | 100                       | 100 | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 90  | 93 | 90 |    |    |
| 54                   | 90                        | 100 | 80  | 90  | 90          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 80  | 85 | 89 |    |    |
| 158                  | 90                        | 90  | 95  | 95  | 95          | 95  | 95  | 95  | 95          | 95  | 95  | 95  | 95          | 95  | 90 | 91 |    |    |
| 53                   | 85                        | 90  | 100 | 98  | 98          | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 96  | 97 |    |    |    |
| 160                  | 50                        | 60  | 70  | 95  | 95          | 70  | 70  | 70  | 70          | 70  | 70  | 70  | 70          | 79  | 77 |    |    |    |
| 159                  | 70                        | 70  | 80  | 95  | 95          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 84  | 85 |    |    |    |
| 52                   | 80                        | 80  | 70  | 98  | 98          | 70  | 70  | 70  | 70          | 70  | 70  | 70  | 70          | 82  | 81 |    |    |    |
| 157                  | 95                        | 100 | 100 | 95  | 95          | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 98  | 98 |    |    |    |
| 156                  | 85                        | 100 | 100 | 90  | 90          | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 90  | 95 |    |    |    |
| 155                  | 80                        | 80  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 88  | 88 |    |    |    |
| 154                  | 70                        | 90  | 80  | 95  | 95          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 79  | 82 |    |    |    |
| 153                  | 70                        | 70  | 80  | 98  | 98          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 85  | 82 |    |    |    |
| 151                  | 60                        | 70  | 70  | 96  | 96          | 70  | 70  | 70  | 70          | 70  | 70  | 70  | 70          | 79  | 82 |    |    |    |
| 51                   | 60                        | 95  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 87  | 95 |    |    |    |
| 15 DE NOVIEMBRE 2003 |                           |     |     |     |             |     |     |     |             |     |     |     |             |     |    |    |    |    |
| 167                  | 80                        | 90  | 70  | 80  | 95          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 80  | 81 | 90 |    |    |
| 60                   | 60                        | 50  | 70  | 60  | 70          | 60  | 60  | 60  | 60          | 60  | 60  | 60  | 60          | 60  | 74 | 69 |    |    |
| 165                  | 50                        | 50  | 80  | 70  | 98          | 70  | 70  | 70  | 70          | 70  | 70  | 70  | 70          | 75  | 71 | 71 |    |    |
| 166                  | 90                        | 100 | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 93  | 97 | 97 |    |    |
| 164                  | 95                        | 100 | 85  | 95  | 95          | 85  | 85  | 85  | 85          | 85  | 85  | 85  | 85          | 94  | 95 | 95 |    |    |
| 59                   | 70                        | 70  | 50  | 40  | 85          | 50  | 50  | 50  | 50          | 50  | 50  | 50  | 50          | 56  | 53 | 53 |    |    |
| 163                  | 80                        | 80  | 95  | 95  | 95          | 95  | 95  | 95  | 95          | 95  | 95  | 95  | 95          | 93  | 91 | 91 |    |    |
| 58                   | 60                        | 70  | 90  | 80  | 80          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 83  | 88 | 88 |    |    |
| 57                   | 70                        | 80  | 90  | 70  | 70          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 75  | 88 | 88 |    |    |
| 162                  | 60                        | 70  | 50  | 100 | 80          | 50  | 50  | 50  | 50          | 50  | 50  | 50  | 50          | 60  | 89 | 89 |    |    |
| 56                   | 90                        | 90  | 95  | 90  | 95          | 90  | 90  | 90  | 90          | 90  | 90  | 90  | 90          | 95  | 94 | 94 |    |    |
| 152                  | 85                        | 85  | 80  | 90  | 90          | 80  | 80  | 80  | 80          | 80  | 80  | 80  | 80          | 86  | 88 | 88 |    |    |

| SITE No. | RATE (%) 15 NOVEMBER 2003 |     |     |     |             |    |    |     |             |     |    |    | AVERAGE (%) |    |  |  |    |    |
|----------|---------------------------|-----|-----|-----|-------------|----|----|-----|-------------|-----|----|----|-------------|----|--|--|----|----|
|          | NAS                       |     |     |     | MINAMBIENTE |    |    |     | AUDITOR DNE |     |    |    | DIRAN       |    |  |  | EC | EP |
|          | EC                        | EP  | EC  | EP  | EC          | EP | EC | EP  | EC          | EP  | EC | EP | EC          | EP |  |  |    |    |
| 50       | 95                        | 95  | 95  | 95  | 90          | 90 | 97 | 85  | 90          | 85  | 94 | 91 | 94          |    |  |  |    |    |
| 150      | 90                        | 100 | 90  | 90  | 90          | 90 | 90 | 80  | 80          | 80  | 88 | 88 | 90          |    |  |  |    |    |
| 49       | 100                       | 100 | 80  | 80  | 95          | 95 | 95 | 100 | 100         | 100 | 94 | 94 | 94          |    |  |  |    |    |
| 61       | 70                        | 85  | 90  | 90  | 90          | 90 | 95 | 85  | 80          | 85  | 84 | 84 | 88          |    |  |  |    |    |
| 48       | 30                        | 95  | 40  | 60  | 80          | 80 | 90 | 75  | 60          | 75  | 56 | 56 | 76          |    |  |  |    |    |
| 149      | 95                        | 100 | 90  | 80  | 98          | 99 | 99 | 100 | 100         | 100 | 96 | 96 | 95          |    |  |  |    |    |
| 47       | 50                        | 95  | 70  | 90  | 80          | 90 | 90 | 50  | 100         | 50  | 63 | 63 | 94          |    |  |  |    |    |
| 148      | 100                       | 100 | 100 | 100 | 90          | 90 | 90 | 100 | 100         | 100 | 98 | 98 | 98          |    |  |  |    |    |
| 147      | NOT RATED                 |     |     |     |             |    |    |     |             |     |    |    |             |    |  |  |    |    |
| 146      | 70                        | 90  | 70  | 90  | 95          | 98 | 98 | 80  | 100         | 80  | 79 | 79 | 95          |    |  |  |    |    |
| 46       | 95                        | 100 | 95  | 90  | 90          | 96 | 96 | 95  | 95          | 95  | 94 | 94 | 95          |    |  |  |    |    |
| 45       | 70                        | 70  | 70  | 70  | 90          | 90 | 90 | 80  | 90          | 80  | 78 | 78 | 80          |    |  |  |    |    |
| 145      | 80                        | 95  | 60  | 60  | 80          | 80 | 80 | 80  | 70          | 80  | 75 | 75 | 76          |    |  |  |    |    |
| AVERAGE  | 77                        | 86  | 82  | 83  | 90          | 93 | 93 | 85  | 87          | 85  | 84 | 84 | 87          |    |  |  |    |    |

EC = FIELD EFFECTIVENESS

EP = PASSAGE EFFECTIVENESS

Note: In the absence of the official, ICA's rating is not available.

EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS

GUAVIARE PROVINCE NUCLEUS

PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| SITE No. | RATE (%) 17 NOVEMBER 2003 |     |     |     |             |     |     |     |             |     |     |     | AVERAGE (%) |    |    |  |    |    |
|----------|---------------------------|-----|-----|-----|-------------|-----|-----|-----|-------------|-----|-----|-----|-------------|----|----|--|----|----|
|          | MAS                       |     |     |     | MINAMBIENTE |     |     |     | AUDITOR DNE |     |     |     | DIRAN       |    |    |  | EC | EP |
|          | EC                        | EP  | EC  | EP  | EC          | EP  | EC  | EP  | EC          | EP  | EC  | EP  | EC          | EP |    |  |    |    |
| 194      | 100                       | 100 | 80  | 90  | 90          | 90  | 90  | 100 | 100         | 100 | 100 | 100 | 100         | 93 | 95 |  |    |    |
| 195      | 95                        | 90  | 100 | 100 | 100         | 100 | 100 | 80  | 80          | 85  | 85  | 100 | 100         | 93 | 95 |  |    |    |
| 197      | 80                        | 100 | 70  | 70  | 80          | 80  | 85  | 100 | 100         | 100 | 100 | 100 | 100         | 83 | 89 |  |    |    |
| 199      | 70                        | 95  | 80  | 80  | 80          | 80  | 85  | 85  | 80          | 80  | 80  | 90  | 100         | 80 | 90 |  |    |    |
| 198      | 95                        | 100 | 70  | 70  | 95          | 97  | 97  | 95  | 80          | 80  | 80  | 95  | 95          | 85 | 91 |  |    |    |
| 193      | 100                       | 100 | 80  | 80  | 90          | 90  | 90  | 90  | 80          | 80  | 80  | 90  | 90          | 88 | 90 |  |    |    |
| 209      | 50                        | 100 | 100 | 100 | 90          | 90  | 95  | 95  | 95          | 95  | 95  | 95  | 95          | 84 | 98 |  |    |    |
| 135      | 80                        | 90  | 95  | 95  | 95          | 95  | 97  | 97  | 85          | 85  | 85  | 95  | 95          | 89 | 94 |  |    |    |
| 206      | 95                        | 100 | 90  | 90  | 95          | 96  | 96  | 96  | 100         | 100 | 100 | 100 | 100         | 95 | 97 |  |    |    |
| 207      | 100                       | 100 | 95  | 95  | 95          | 97  | 97  | 97  | 100         | 100 | 100 | 100 | 100         | 98 | 98 |  |    |    |
| 208      | 80                        | 90  | 90  | 70  | 90          | 90  | 95  | 95  | 80          | 80  | 80  | 100 | 100         | 85 | 89 |  |    |    |
| 192      | 60                        | 80  | 85  | 85  | 90          | 90  | 95  | 95  | 80          | 80  | 80  | 95  | 95          | 79 | 89 |  |    |    |
| 37       | 100                       | 100 | 90  | 90  | 90          | 90  | 95  | 95  | 100         | 100 | 100 | 100 | 100         | 95 | 96 |  |    |    |
| 191      | 100                       | 100 | 85  | 80  | 90          | 90  | 95  | 95  | 90          | 90  | 90  | 95  | 95          | 91 | 93 |  |    |    |
| 190      | 100                       | 100 | 80  | 80  | 95          | 90  | 90  | 90  | 100         | 100 | 100 | 100 | 100         | 94 | 93 |  |    |    |
| 189      | 100                       | 100 | 90  | 60  | 90          | 90  | 90  | 90  | 90          | 90  | 90  | 95  | 95          | 93 | 86 |  |    |    |
| 188      | 95                        | 100 | 90  | 90  | 90          | 90  | 95  | 95  | 100         | 100 | 100 | 100 | 100         | 94 | 96 |  |    |    |
| 43       | 100                       | 100 | 90  | 90  | 90          | 90  | 95  | 95  | 100         | 100 | 100 | 100 | 100         | 95 | 96 |  |    |    |
| 187      | 100                       | 100 | 90  | 90  | 90          | 90  | 90  | 90  | 100         | 100 | 100 | 100 | 100         | 95 | 95 |  |    |    |
| 186      | 95                        | 100 | 90  | 90  | 90          | 90  | 95  | 95  | 100         | 100 | 100 | 100 | 100         | 94 | 96 |  |    |    |
| 185      | 100                       | 100 | 95  | 95  | 90          | 90  | 95  | 95  | 90          | 90  | 90  | 95  | 95          | 94 | 96 |  |    |    |
| 35       | 100                       | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 100 | 100 | 100 | 100         | 99 | 99 |  |    |    |
| 183      | 100                       | 90  | 80  | 80  | 80          | 80  | 90  | 90  | 90          | 90  | 90  | 95  | 95          | 88 | 89 |  |    |    |
| 169      | 95                        | 100 | 70  | 70  | 95          | 96  | 96  | 96  | 100         | 100 | 100 | 100 | 100         | 90 | 92 |  |    |    |
| 182      | 95                        | 100 | 80  | 85  | 85          | 95  | 95  | 95  | 100         | 100 | 100 | 100 | 100         | 90 | 95 |  |    |    |
| 217      | 100                       | 100 | 80  | 90  | 96          | 98  | 98  | 98  | 100         | 100 | 100 | 100 | 100         | 94 | 97 |  |    |    |
| 171      | 90                        | 90  | 90  | 90  | 96          | 96  | 96  | 96  | 90          | 90  | 90  | 96  | 100         | 92 | 94 |  |    |    |
| 168      | 90                        | 100 | 90  | 90  | 90          | 90  | 90  | 90  | 100         | 100 | 100 | 100 | 100         | 93 | 95 |  |    |    |
| 31       | 80                        | 80  | 80  | 80  | 90          | 90  | 90  | 90  | 100         | 100 | 100 | 100 | 100         | 88 | 88 |  |    |    |

| SITE No. | RATE (%) 17 NOVEMBER 2003 |     |     |     |             |    |    |    |             |    |    |     | AVERAGE (%) |    |    |  |    |    |
|----------|---------------------------|-----|-----|-----|-------------|----|----|----|-------------|----|----|-----|-------------|----|----|--|----|----|
|          | NAS                       |     |     |     | MINAMBIENTE |    |    |    | AUDITOR DNE |    |    |     | DIRAN       |    |    |  | EC | EP |
|          | EC                        | EP  | EC  | EP  | EC          | EP | EC | EP | EC          | EP | EC | EP  | EC          | EP |    |  |    |    |
| 177      | 70                        | 80  | 90  | 90  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 100 | 100         | 88 | 90 |  |    |    |
| 180      | 100                       | 100 | 90  | 90  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 100 | 100         | 95 | 95 |  |    |    |
| 175      | 90                        | 100 | 90  | 80  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 100 | 100         | 93 | 94 |  |    |    |
| 33       | 100                       | 100 | 90  | 90  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 100 | 100         | 95 | 95 |  |    |    |
| 42       | 100                       | 100 | 90  | 90  | 90          | 90 | 90 | 95 | 95          | 95 | 95 | 100 | 100         | 96 | 96 |  |    |    |
| 174      | 100                       | 80  | 90  | 80  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 95  | 95          | 94 | 86 |  |    |    |
| 179      | 85                        | 90  | 95  | 95  | 80          | 80 | 80 | 80 | 80          | 80 | 80 | 95  | 95          | 89 | 94 |  |    |    |
| 216      | 100                       | 100 | 90  | 90  | 90          | 90 | 90 | 95 | 95          | 95 | 95 | 100 | 100         | 95 | 95 |  |    |    |
| 218      | 90                        | 100 | 100 | 100 | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 80  | 90          | 90 | 97 |  |    |    |
| 178      | 60                        | 80  | 80  | 80  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 90  | 95          | 80 | 88 |  |    |    |
| 34       | 70                        | 70  | 90  | 90  | 90          | 85 | 85 | 85 | 85          | 85 | 85 | 100 | 100         | 86 | 88 |  |    |    |
| 220      | 100                       | 100 | 80  | 80  | 60          | 60 | 60 | 60 | 60          | 60 | 60 | 100 | 95          | 85 | 79 |  |    |    |
| 44       | 100                       | 100 | 70  | 70  | 70          | 70 | 70 | 60 | 60          | 60 | 60 | 100 | 100         | 83 | 80 |  |    |    |
| 219      | 70                        | 100 | 70  | 70  | 70          | 70 | 70 | 90 | 90          | 90 | 90 | 100 | 100         | 83 | 90 |  |    |    |
| 221      | 70                        | 100 | 90  | 90  | 80          | 80 | 80 | 80 | 80          | 80 | 80 | 100 | 100         | 85 | 95 |  |    |    |
| 222      | 100                       | 100 | 90  | 90  | 90          | 90 | 90 | 90 | 90          | 90 | 90 | 100 | 100         | 95 | 96 |  |    |    |
| AVERAGE  | 90                        | 96  | 87  | 86  | 89          | 91 | 91 | 95 | 95          | 98 | 98 | 90  | 90          | 93 | 93 |  |    |    |

EC = FIELD EFFECTIVENESS

EP = PASSAGE EFFECTIVENESS

Note: In the absence of the official, ICA's rating is not available.



EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS  
 ARAUCA PROVINCE NUCLEUS  
 PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| SITE No. | RATE (%) 19 NOVEMBER 2003 |     |    |    |             |    |    |    |     |     |     |     |              |     | AVERAGE (%) |     |       |    |    |    |
|----------|---------------------------|-----|----|----|-------------|----|----|----|-----|-----|-----|-----|--------------|-----|-------------|-----|-------|----|----|----|
|          | NAS                       |     |    |    | MINAMBIENTE |    |    |    | ICA |     |     |     | AUDITOR DINE |     |             |     | DIRAN |    | EC | EP |
|          | EC                        | EP  | EC | EP | EC          | EP | EC | EP | EC  | EP  | EC  | EP  | EC           | EP  | EC          | EP  |       |    |    |    |
| 93       | 95                        | 100 | 80 | 80 | 95          | 90 | 90 | 95 | 90  | 95  | 90  | 90  | 95           | 90  | 80          | 100 | 89    | 92 |    |    |
| 92       | 70                        | 95  | 70 | 80 | 90          | 85 | 80 | 85 | 80  | 90  | 85  | 80  | 85           | 80  | 80          | 95  | 79    | 87 |    |    |
| 91       | 80                        | 85  | 80 | 80 | 90          | 90 | 90 | 90 | 90  | 90  | 90  | 85  | 90           | 90  | 90          | 100 | 86    | 88 |    |    |
| 90       | 80                        | 100 | 90 | 90 | 70          | 90 | 90 | 90 | 90  | 90  | 90  | 90  | 90           | 80  | 80          | 100 | 82    | 94 |    |    |
| 89       | 90                        | 100 | 90 | 80 | 90          | 95 | 90 | 95 | 95  | 100 | 100 | 100 | 100          | 90  | 90          | 100 | 91    | 95 |    |    |
| 88       | 90                        | 95  | 90 | 90 | 90          | 95 | 90 | 95 | 90  | 90  | 90  | 90  | 90           | 80  | 80          | 100 | 88    | 94 |    |    |
| 86       | 90                        | 95  | 90 | 90 | 90          | 95 | 90 | 95 | 85  | 90  | 90  | 90  | 90           | 50  | 100         | 81  | 94    |    |    |    |
| 85       | 70                        | 90  | 70 | 70 | 90          | 95 | 90 | 95 | 85  | 85  | 85  | 85  | 70           | 70  | 100         | 77  | 88    |    |    |    |
| 84       | 70                        | 85  | 70 | 80 | 80          | 95 | 80 | 95 | 80  | 80  | 80  | 80  | 80           | 80  | 100         | 76  | 88    |    |    |    |
| 83       | 60                        | 100 | 50 | 50 | 90          | 95 | 90 | 95 | 80  | 90  | 90  | 90  | 90           | 90  | 100         | 74  | 87    |    |    |    |
| 82       | 80                        | 80  | 60 | 80 | 80          | 80 | 80 | 90 | 85  | 90  | 90  | 90  | 60           | 60  | 100         | 73  | 88    |    |    |    |
| 81       | 60                        | 100 | 70 | 90 | 80          | 95 | 80 | 95 | 80  | 90  | 90  | 90  | 70           | 100 | 72          | 95  |       |    |    |    |
| 80       | 90                        | 95  | 80 | 80 | 90          | 95 | 80 | 95 | 90  | 90  | 90  | 90  | 95           | 95  | 100         | 89  | 92    |    |    |    |
| 79       | 80                        | 85  | 80 | 80 | 70          | 90 | 80 | 90 | 80  | 90  | 90  | 90  | 80           | 80  | 100         | 78  | 89    |    |    |    |
| 78       | 70                        | 85  | 80 | 80 | 70          | 90 | 70 | 90 | 80  | 90  | 90  | 90  | 70           | 70  | 100         | 74  | 89    |    |    |    |
| 77       | 80                        | 90  | 80 | 90 | 90          | 95 | 90 | 95 | 85  | 90  | 90  | 90  | 90           | 90  | 100         | 85  | 93    |    |    |    |
| 76       | 85                        | 90  | 90 | 90 | 80          | 90 | 80 | 90 | 80  | 90  | 90  | 90  | 95           | 95  | 100         | 86  | 92    |    |    |    |
| AVERAGE  | 79                        | 92  | 78 | 81 | 84          | 92 | 86 | 89 | 89  | 89  | 89  | 89  | 79           | 79  | 100         | 81  | 91    |    |    |    |

EC = FIELD EFFECTIVENESS  
 EP = PASSAGE EFFECTIVENESS

EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS  
 NORTE DE SANTANDER PROVINCE NUCLEUS  
 PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| SITE No.                  | RATE (%) 20 NOVEMBER 2003 |     |             |     |             |    |     |     |       |             |                                |    | AVERAGE (%) |  |
|---------------------------|---------------------------|-----|-------------|-----|-------------|----|-----|-----|-------|-------------|--------------------------------|----|-------------|--|
|                           | NAS                       |     | MINAMBIENTE |     | AUDITOR DNE |    | ICA |     | DIRAN |             | EC                             | EP |             |  |
|                           | EC                        | EP  | EC          | EP  | EC          | EP | EC  | EP  | EC    | EP          |                                |    |             |  |
| 11                        | 95                        | 95  | 95          | 95  | 90          | 95 | 90  | 90  | 90    | 98          | 100                            | 94 | 95          |  |
| 264                       | 90                        | 95  | 95          | 95  | 85          | 95 | 85  | 90  | 90    | 98          | 100                            | 91 | 95          |  |
| 263                       | 90                        | 95  | 90          | 100 | 95          | 95 | 95  | 100 | 100   | 100         | 100                            | 94 | 98          |  |
| 262                       | 80                        | 90  | 95          | 95  | 90          | 95 | 95  | 100 | 100   | 96          | 100                            | 91 | 96          |  |
| 261                       | 85                        | 95  | 90          | 90  | 90          | 96 | 85  | 90  | 98    | 98          | 100                            | 90 | 94          |  |
| 7                         | 85                        | 80  | 95          | 85  | 90          | 90 | 85  | 90  | 90    | 60          | 95                             | 87 | 88          |  |
| 259                       | 95                        | 95  | 95          | 95  | 90          | 95 | 90  | 95  | 95    | NO HAY COCA | VERIFICAR CON IMAGEN SATELITAL | 93 | 95          |  |
| 5                         | 95                        | 100 | 95          | 95  | 90          | 90 | 95  | 90  | 90    | 100         | 96                             | 95 | 94          |  |
| 4                         | 75                        | 85  | 90          | 90  | 70          | 90 | 75  | 90  | 90    | 80          | 85                             | 78 | 88          |  |
| 260                       | 60                        | 80  | 95          | 95  | 85          | 90 | 70  | 80  | 80    | 90          | 90                             | 80 | 87          |  |
| 265                       | 85                        | 80  | 95          | 95  | 90          | 95 | 90  | 90  | 90    | 90          | 95                             | 90 | 91          |  |
| RATE (%) 22 NOVEMBER 2003 |                           |     |             |     |             |    |     |     |       |             |                                |    |             |  |
| 1                         | 85                        | 90  | 95          | 85  | 90          | 90 | 90  | 90  | 90    | 85          | 90                             | 89 | 89          |  |
| 2                         | 85                        | 90  | 90          | 90  | 90          | 90 | 85  | 90  | 90    | 100         | 100                            | 90 | 92          |  |
| 224                       | 95                        | 95  | 95          | 95  | 90          | 95 | 90  | 90  | 90    | 100         | 100                            | 94 | 95          |  |
| 225                       | 50                        | 40  | 95          | 85  | 80          | 85 | 95  | 90  | 90    | 100         | 100                            | 84 | 80          |  |
| 3                         | 80                        | 95  | 90          | 90  | 90          | 90 | 90  | 90  | 90    | 90          | 95                             | 88 | 92          |  |
| 227                       | 70                        | 90  | 90          | 90  | 70          | 80 | 90  | 90  | 95    | 90          | 90                             | 82 | 89          |  |
| 242                       | 70                        | 100 | 85          | 80  | 80          | 90 | 90  | 90  | 90    | 95          | 95                             | 84 | 91          |  |
| 241                       | 80                        | 100 | 90          | 90  | 85          | 90 | 90  | 90  | 90    | 90          | 100                            | 87 | 94          |  |
| 240                       | 100                       | 100 | 90          | 95  | 90          | 90 | 95  | 90  | 95    | 100         | 100                            | 95 | 96          |  |
| 236                       | 90                        | 90  | 90          | 95  | 70          | 80 | 90  | 90  | 85    | 90          | 95                             | 86 | 89          |  |
| 229                       | 70                        | 80  | 90          | 90  | 90          | 90 | 90  | 90  | 90    | 90          | 90                             | 86 | 88          |  |
| 231                       | 85                        | 95  | 90          | 90  | 90          | 90 | 95  | 90  | 90    | 90          | 90                             | 90 | 91          |  |
| 230                       | 80                        | 95  | 85          | 90  | 90          | 90 | 85  | 90  | 85    | 85          | 95                             | 85 | 92          |  |
| 232                       | 90                        | 100 | 95          | 95  | 90          | 90 | 95  | 90  | 90    | 100         | 100                            | 94 | 95          |  |
| 233                       | 60                        | 70  | 90          | 95  | 70          | 85 | 90  | 85  | 85    | 70          | 90                             | 76 | 85          |  |
| 235                       | 60                        | 60  | 80          | 80  | 70          | 85 | 80  | 80  | 85    | 80          | 95                             | 74 | 81          |  |
| 237                       | NC                        | NC  | NC          | NC  | 40          | 50 | NC  | NC  | NC    | NC          | NC                             | 40 | 50          |  |
| 238                       | 85                        | 80  | 70          | 70  | 80          | 90 | 75  | 80  | 80    | 70          | 85                             | 76 | 81          |  |
| 239                       | 60                        | 100 | 50          | 50  | 50          | 50 | 60  | 80  | 80    | 60          | 80                             | 56 | 72          |  |
| AVERAGE                   | 80                        | 88  | 89          | 84  | 84          | 89 | 87  | 87  | 87    | 90          | 90                             | 86 | 90          |  |

EVALUATION OF THE EFFECTIVENESS OF AERIAL SPRAYING OVER ILLICIT COCA CROPS

ANTIOQUIA PROVINCE NUCLEUS

PERIOD FROM 1 JANUARY TO 31 OCTOBER 2003

| PLOT No. | RATE (%) 24 NOVEMBER 2003 |     |    |             |     |    |             |    |    |     |    |     | AVERAGE (%) |     |    |    |
|----------|---------------------------|-----|----|-------------|-----|----|-------------|----|----|-----|----|-----|-------------|-----|----|----|
|          | NAS                       |     |    | MINAMBIENTE |     |    | AUDITOR/DNE |    |    | ICA |    |     | DIRAN       |     | EC | EP |
|          | EC                        | EP  | EP | EC          | EP  | EP | EC          | EP | EP | EC  | EP | EP  | EC          | EP  |    |    |
| 99       | 90                        | 90  | 95 | 95          | 95  | 90 | 90          | 90 | 95 | 95  | 95 | 95  | 95          | 90  | 93 | 92 |
| 14       | 95                        | 100 | 70 | 100         | 100 | 80 | 85          | 85 | 65 | 80  | 85 | 85  | 85          | 95  | 81 | 92 |
| 15       | 60                        | 85  | 95 | 100         | 100 | 90 | 90          | 90 | 95 | 95  | 95 | 100 | 100         | 100 | 88 | 94 |
| 16       | 95                        | 95  | 90 | 90          | 90  | 90 | 90          | 90 | 90 | 90  | 90 | 100 | 100         | 100 | 93 | 93 |
| 100      | 80                        | 80  | 70 | 70          | 70  | 80 | 85          | 85 | 70 | 80  | 80 | 60  | 90          | 72  | 72 | 81 |
| 17       | 100                       | 100 | 80 | 90          | 90  | 50 | 70          | 70 | 60 | 70  | 70 | 95  | 90          | 77  | 77 | 84 |
| 103      | 50                        | 70  | 90 | 95          | 95  | 80 | 90          | 90 | 80 | 80  | 80 | 95  | 95          | 79  | 79 | 86 |
| 18       | 75                        | 85  | 95 | 95          | 95  | 80 | 90          | 90 | 90 | 90  | 90 | 90  | 95          | 86  | 86 | 91 |
| 19       | 90                        | 90  | 90 | 90          | 90  | 80 | 90          | 90 | 90 | 90  | 90 | 95  | 95          | 89  | 89 | 91 |
| 104      | 90                        | 90  | 80 | 90          | 90  | 80 | 80          | 80 | 85 | 85  | 85 | 80  | 95          | 83  | 83 | 89 |
| 21       | 95                        | 95  | 90 | 90          | 90  | 85 | 90          | 90 | 95 | 95  | 95 | 100 | 100         | 93  | 93 | 94 |
| 108      | 60                        | 80  | 80 | 80          | 80  | 60 | 60          | 60 | 80 | 80  | 80 | 70  | 95          | 70  | 70 | 82 |
| 106      | 70                        | 90  | 80 | 95          | 95  | 80 | 90          | 90 | 80 | 80  | 85 | 50  | 90          | 72  | 72 | 90 |
| 107      | 95                        | 95  | 95 | 100         | 100 | 50 | 50          | 50 | 95 | 95  | 95 | 100 | 100         | 87  | 87 | 88 |
| 109      | 60                        | 50  | 90 | 90          | 90  | 70 | 90          | 90 | 80 | 85  | 85 | 80  | 95          | 76  | 76 | 84 |
| 110      | 85                        | 95  | 95 | 95          | 95  | 80 | 85          | 85 | 90 | 90  | 90 | 90  | 95          | 88  | 88 | 92 |
| 22       | 95                        | 100 | 90 | 90          | 90  | 80 | 90          | 90 | 75 | 90  | 95 | 95  | 100         | 87  | 87 | 94 |
| 111      | 75                        | 85  | 95 | 95          | 95  | 90 | 90          | 90 | 90 | 90  | 90 | 85  | 90          | 87  | 87 | 90 |
| 23       | 70                        | 100 | 90 | 90          | 90  | 90 | 90          | 90 | 95 | 95  | 95 | 100 | 100         | 89  | 89 | 95 |
| 112      | 95                        | 100 | 80 | 80          | 80  | 70 | 85          | 85 | 70 | 75  | 85 | 100 | 100         | 83  | 83 | 90 |
| 113      | 70                        | 90  | 90 | 90          | 90  | 80 | 90          | 90 | 85 | 85  | 90 | 85  | 95          | 82  | 82 | 91 |
| 114      | 70                        | 95  | 95 | 95          | 95  | 80 | 90          | 95 | 95 | 95  | 95 | 95  | 95          | 87  | 87 | 95 |
| 25       | 60                        | 70  | 80 | 80          | 80  | 70 | 90          | 90 | 90 | 90  | 90 | 90  | 90          | 78  | 78 | 84 |
| 116      | 50                        | 85  | 70 | 70          | 70  | 70 | 70          | 70 | 60 | 60  | 60 | 50  | 90          | 60  | 60 | 81 |
| 115      | 60                        | 80  | 80 | 80          | 80  | 80 | 90          | 90 | 90 | 90  | 90 | 95  | 100         | 81  | 81 | 88 |
| 117      | 85                        | 85  | 85 | 85          | 85  | 80 | 90          | 90 | 90 | 90  | 95 | 90  | 70          | 86  | 86 | 85 |
| 118      | 90                        | 90  | 90 | 90          | 90  | 90 | 90          | 90 | 95 | 95  | 95 | 70  | 85          | 87  | 87 | 90 |
| 27       | 95                        | 95  | 80 | 80          | 80  | 90 | 90          | 90 | 90 | 90  | 90 | 80  | 95          | 87  | 87 | 90 |
| 119      | 70                        | 80  | 70 | 70          | 70  | 70 | 85          | 85 | 80 | 80  | 80 | 90  | 90          | 76  | 76 | 81 |
| 28       | 95                        | 100 | 95 | 95          | 95  | 80 | 90          | 90 | 90 | 90  | 90 | 100 | 100         | 92  | 92 | 95 |
| 120      | 95                        | 100 | 90 | 90          | 90  | 85 | 90          | 90 | 90 | 90  | 90 | 100 | 100         | 92  | 92 | 94 |
| AVERAGE  | 80                        | 89  | 86 | 89          | 89  | 78 | 85          | 85 | 85 | 85  | 89 | 86  | 94          | 83  | 83 | 89 |

EC = FIELD EFFECTIVENESS  
EP = PASSAGE EFFECTIVENESS

## **2. AUDIT ON THE DEVELOPMENT OF THE PECIG PROGRAMS AND PROCEDURES.**

Following the forms developed for use in following up the various EMP activities, Environmental Audit has the following comments:

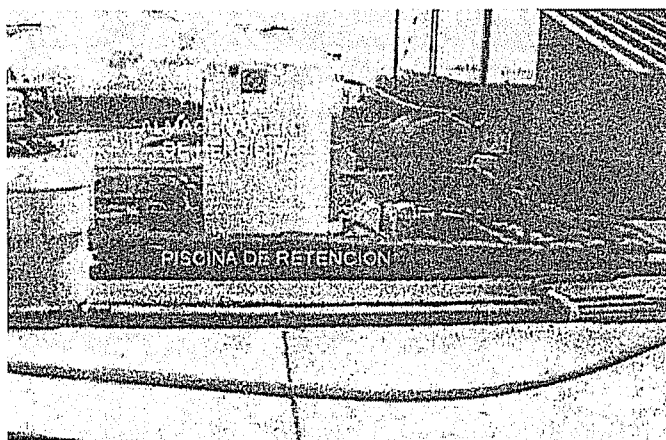
Operations Base at San Jose del Guaviare (Guaviare), and mobile bases at Apiay and Tame.

### **Evaluation of the spraying operations management program.**

- Activities were undertaken to verify and evaluate the efficiency and effectiveness of environmental management measures. 180 sites located in the departments of Nariño, Putumayo, Guaviare, Arauca, Norte de Santander and Antioquia were verified. Section 1 refers to the activities undertaken, and field observations.

### **Evaluation of the industrial safety program in operations bases.**

- Stronger industrial and environmental safety measures were introduced for the handling of agrochemicals in the San Jose del Guaviare base. The measures consist of the installation of holding pools in the herbicide transition storage area, and in the mixing area, as shown in the photograph below.



**Key: Piscina de retención – Holding pool**

### Evaluation of the solid waste management program.

- This was made to implement some of the records required by EMP Instruction Sheet 3

### Evaluation of the wastewater management program for PECIG bases.

- This was to implement recycling plants or treatment plants for aircraft washing water, and herbicide bin washing (mobile and fixed bases).

### Evaluation of the environmental monitoring program

In the course of the verifying process for the effectiveness of aerial spraying, the DIRAN collected up soil samples in the departments of Guaviare, Nariño and Putumayo, to determine the level of residues of the herbicide Glyphosate.

The chart below shows the location of the sites where the samples were collected, the accounting, the date of application of the glyphosate herbicide, the date of collection, and days elapsed since spraying.

| No. SITIO | MUNICIPIO         | COORDENADAS              | FECHA DE LA ASPERSION | FECHA RECOLECCION DE LA MUESTRA | DIAS TRANSCURRIDOS |
|-----------|-------------------|--------------------------|-----------------------|---------------------------------|--------------------|
| 158       | Valle del Guamuéz | 0° 26' 19" - 76° 53' 37" | 12/07/03              | 14/11/03                        | 126                |
| 152       | Valle del Guamuéz | 0° 24' 07" - 76° 48' 27" | 04/07/03              | 15/11/03                        | 135                |
| 154A      | Valle del Guamuéz | 0° 24' 19" - 76° 52' 01" | 23/05/03              | 14/11/03                        | 176                |
| 154B      | Valle del Guamuéz | 0° 24' 19" - 76° 52' 01" | 23/05/03              | 14/11/03                        | 176                |
| 45        | Orito             | 0° 39' 19" - 76° 49' 38" | 18/07/03              | 15/11/03                        | 121                |
| 59        | Orito             | 0° 36' 14" - 76° 59' 46" | 24/05/03              | 15/11/03                        | 176                |
| 157       | Valle del Guamuéz | 0° 22' 45" - 76° 53' 46" | 12/07/03              | 14/11/03                        | 126                |
| 166       | Orito             | 0° 37' 03" - 76° 54' 40" | 27/06/03              | 15/11/03                        | 142                |
| 50        | Valle del Guamuéz | 0° 24' 57" - 76° 47' 12" | 05/07/03              | 15/11/03                        | 134                |
| 162       | Orito             | 0° 30' 17" - 76° 54' 52" | 27/06/03              | 15/11/03                        | 142                |
| 60        | Orito             | 0° 37' 38" - 76° 59' 35" | 06/07/03              | 15/11/03                        | 133                |
| 182A      | El Retomo         | 2° 23' 06" - 72° 30' 28" | 17/03/03              | 17/11/03                        | 248                |

| No. SITIO | MUNICIPIO             | COORDENADAS              | FECHA DE LA ASPERSION | FECHA RECOLECCION DE LA MUESTRA | DIAS TRANSCURRIDOS |
|-----------|-----------------------|--------------------------|-----------------------|---------------------------------|--------------------|
| 182B      | El Retorno            | 2° 23' 06" - 72° 30' 28" | 17/03/03              | 17/11/03                        | 248                |
| 218       | San José del Guaviare | 2° 38' 18" - 72° 22' 48" | 04/08/03              | 17/11/03                        | 105                |
| 171A      | San José del Guaviare | 2° 25' 05" - 72° 30' 16" | 25/01/03              | 17/11/03                        | 297                |
| 171B      | San José del Guaviare | 2° 25' 05" - 72° 30' 16" | 25/01/03              | 17/11/03                        | 297                |
| 175A      | San José del Guaviare | 2° 29' 16" - 72° 25' 29" | 14/05/03              | 17/11/03                        | 188                |
| 175B      | San José del Guaviare | 2° 29' 16" - 72° 25' 29" | 14/05/03              | 17/11/03                        | 188                |
| 174A      | San José del Guaviare | 2° 31' 55" - 72° 26' 28" | 08/07/03              | 17/11/03                        | 133                |
| 174B      | San José del Guaviare | 2° 31' 55" - 72° 26' 28" | 08/07/03              | 17/11/03                        | 133                |
| 179A      | San José del Guaviare | 2° 33' 13" - 72° 24' 35" | 08/07/03              | 17/11/03                        | 133                |
| 179B      | San José del Guaviare | 2° 33' 13" - 72° 24' 35" | 08/07/03              | 17/11/03                        | 133                |
| 168A      | San José del Guaviare | 2° 26' 25" - 72° 33' 49" | 07/03/03              | 17/11/03                        | 134                |
| 168B      | San José del Guaviare | 2° 26' 25" - 72° 33' 49" | 07/03/03              | 17/11/03                        | 134                |
| 142A      | Tumaco                | 1° 30' 46" - 78° 31' 58" | 05/05/03              | 12/11/03                        | 192                |
| 142B      | Tumaco                | 1° 30' 46" - 78° 31' 58" | 05/05/03              | 12/11/03                        | 192                |

Key:

|                                 |                       |
|---------------------------------|-----------------------|
| No. sitio                       | Site No               |
| Municipio                       | Municipality          |
| Coordenadas                     | Coordinates           |
| Fecha de la aspersión           | Date sprayed          |
| Fecha recolección de la muestra | Date sample collected |
| Días transcurridos              | Days elapsed          |

Note. In some sites, compound soil samples were collected on the same plot. In order to identify them, they were followed by the letters A and B. One of the examples was taken from the coca-leaf plantation in production, and the other on every abandoned revegetalized areas.

The soil samples were taken at random on the plot, collecting at least six subsamples, which were mixed up to form a compound sample. The photograph below illustrates the collection of a subsample of soil at Site 154, in the Department of Putumayo.



26 soil samples were collected, and will be sent to Mississippi University (USA), for analysis. In Section 4 ("Reference Documents and Annexes") there is a record of the procedure, to support the activities undertaken.

#### **Evaluation of the communications and social management program.**

- In the period November 2003, seven complaints were made to DIRAN. They are listed here by point of origin:

|                                |   |
|--------------------------------|---|
| Nariño (Tumaco)                | 2 |
| Nariño (La Cruz)               | 1 |
| Antioquia (Tarazá)             | 2 |
| Arauca (Fortul)                | 1 |
| Norte de Santander (Sardinata) | 1 |

- On November 27, DIRAN and DNE officers verified complaints in the municipality of San Jose del Guaviare, Guaviare.

#### **Evaluation of the public health program**

As part of the training program addressed to health professionals and organized by the Ministry of Social Protection and INS, courses have been given in the Departments of Nariño and Putumayo.

### **Evaluation of the contingency plan**

- This was done to implement the development of reports on the occurrence of contingencies in PECIG (Apiay Base).

The forms containing the information which was the basis for the evaluation of PECIG environmental management and progress on the implementation and development of the environmental management plan are included as Annexes.



## 2.1. SUMMARY OF SPRAYING ACTIVITIES.

The charts below show the areas of illicit coca-leaf and opium-poppy crops which were sprayed in November 2003. Graphs 1 and 2 show statistics by Department and Municipality for the illicit coca leaf crops which were sprayed, and Maps 1, 2 and 3 show the areas which were the targets for PECIG.

Tables 1 and 2 show the monthly accumulated totals by department and municipality for coca-leaf and opium-poppy crops sprayed, between January and November 2003.

### SUMMARY OF AERIAL SPRAYING OF ILLICIT COCA LEAF CROPS BY DEPARTMENT AND MUNICIPALITY. NOVEMBER 1-30, 2003

| NT                   |                       | a)             |
|----------------------|-----------------------|----------------|
| ARAUCA               | Araucuita             | 2984.04        |
|                      | Puerto Rondón         | 32.64          |
|                      | Tame                  | 35.68          |
| GUAVIARE             | San José del Guaviare | 952.64         |
| META                 | La Uribe              | 143.32         |
|                      | Mesetas               | 385.50         |
|                      | Mapiripán             | 82.69          |
|                      | Puerto Concordia      | 693.15         |
|                      | Puerto Lleras         | 784.71         |
|                      | Puerto Rico           | 130.99         |
|                      | Vista Hermosa         | 42.91          |
| <b>TOTAL PERIODO</b> |                       | <b>6268.27</b> |

Data for November 1-30, 2003

**SUMMARY CHART OF AERIAL SPRAYING OF ILLICIT OPIUM POPPY CROPS  
BY DEPARTMENT AND MUNICIPALITY.**

**NOVEMBER 1-30, 2003**

| DEPARTAMENTO         | MUNICIPIO | AREA (ha) |
|----------------------|-----------|-----------|
| -                    | -         | -         |
| <b>TOTAL PERIODO</b> |           | <b>0</b>  |

Data for November 1-30, 2003

Key:

Departamento

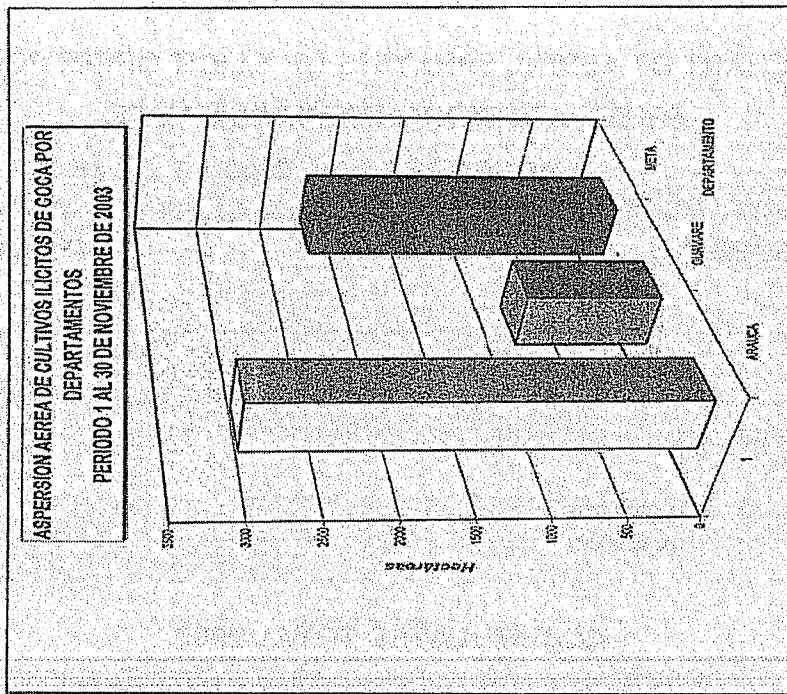
Department

Municipio

Municipality

**ACCUMULATED TOTAL 2003**

|   |             |
|---|-------------|
| Total sprayed for illicit drug and if crops, January 1-November 30, 2003      | 124, 531.29 |
| Total area sprayed for illicit opium poppy crops, January 1-November 30, 2003 | 2,527.11.   |



Key: Graph 1

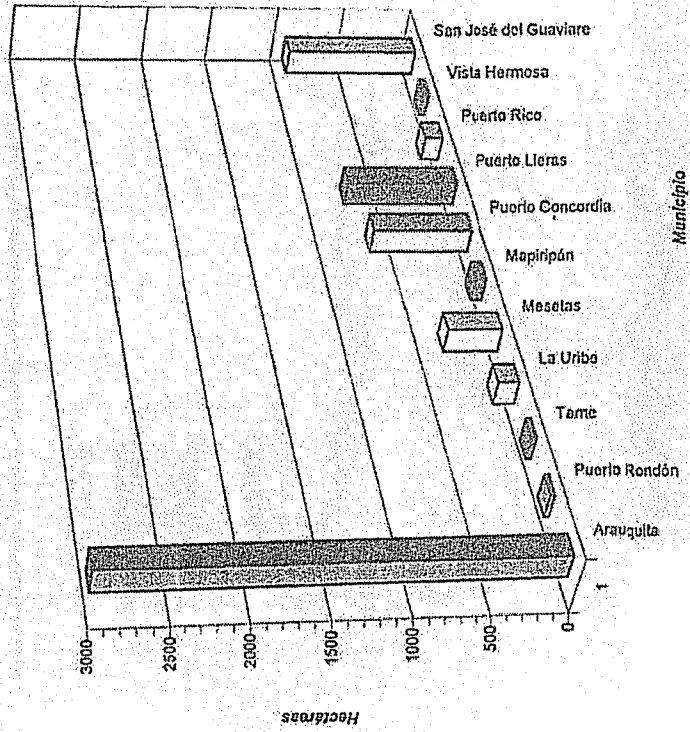
Aerial spraying of illicit coca-leaf crops

By Department

November 1-30, 2003

GRAFICA No. 2

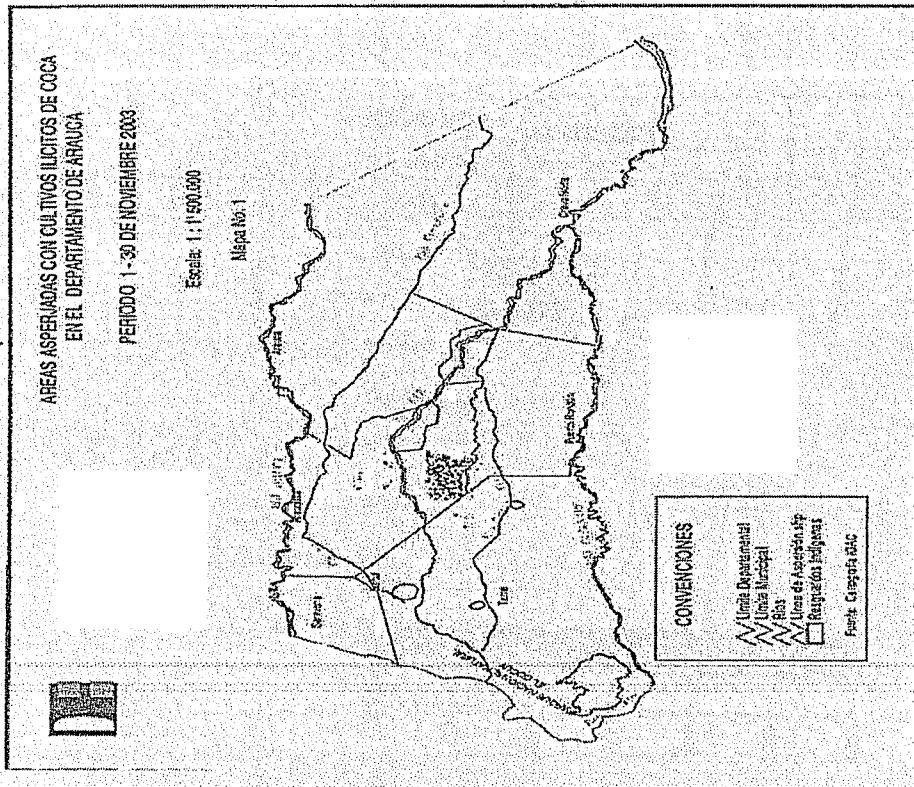
**ASPERSION AEREA DE CULTIVOS ILICITOS DE COCA POR MUNICIPIOS  
PERIODO 1 AL 30 DE NOVIEMBRE DE 2003**



Key: Graph 2

Aerial spraying of illicit coca-leaf crops by municipality

Period November 1-30, 2003



Key to Map 1

AREAS SPRAYED WITH ILLICIT COCA-LEAF CROPS EN ARAUCA

PERIOD NOVEMBER 1-30, 2003

Scale 1:1,500,000

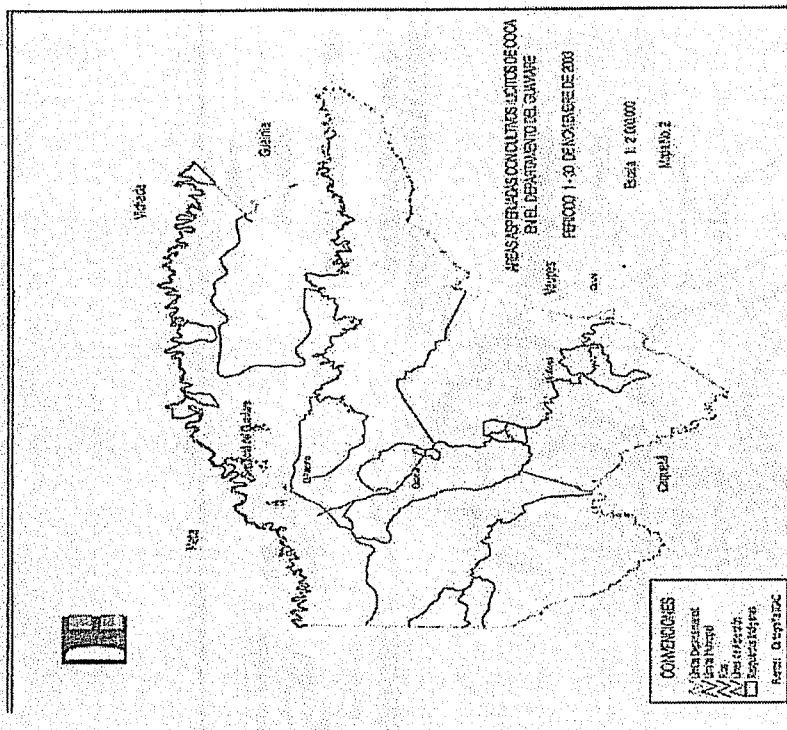
Conventions; Limite Departamental = Departmental boundary

Límite municipal= Municipal boundary

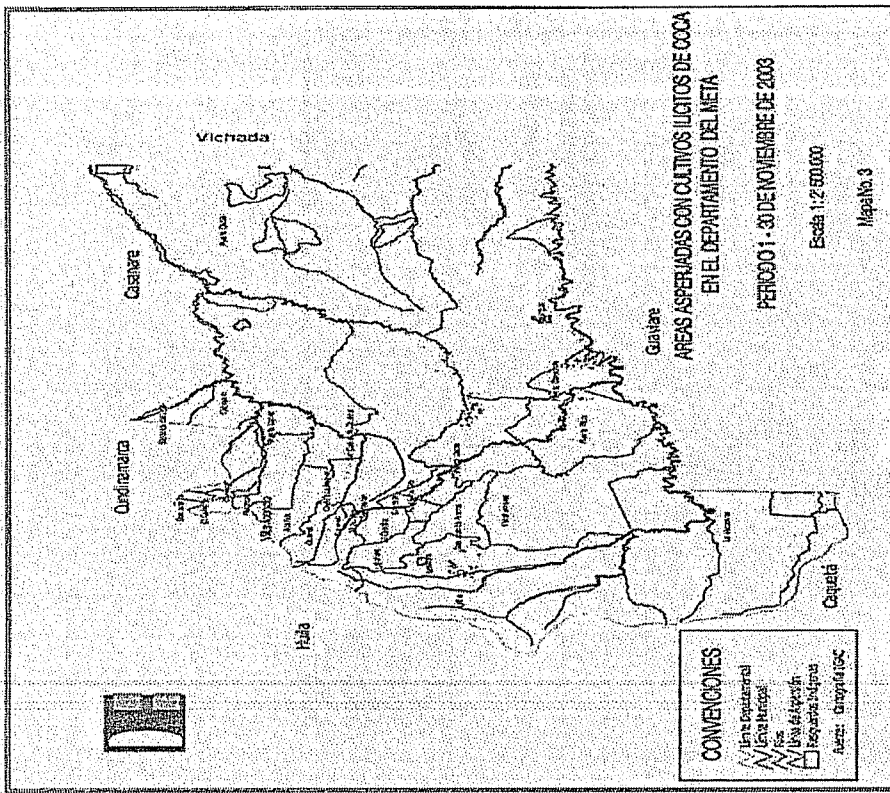
Ríos=Rivers

Linea de aspersion.shp=Spraying line

Resguardos indigenas= Indigenous reservations



Key to Map 2:  
 Areas of Illicit Coca-Leaf Crop Sprayed  
 Department of Guaviare  
 Period November 1-30, 2003  
 Scale 1:2,000,000  
 Conventions: See Map 1



**Key to Map 3**

**Areas Sprayed for Illicit Coca-Leaf Crops**

**Department of Meta**

**Period November 1-30, 2003**

**Scale 1:2,000,000**

**Conventions: See Map 1**

TABLE 1  
**TOTAL AREA SPRAYED FOR ILLICIT COCA-LEAF CROPS**  
**PERIOD NOVEMBER 1-30, 2003**

| DEPARTAMENTO | MUNICIPIO    | TOTAL AREA SPRAYED |      | NOV |    | DICI |    | ENERO |    | FEBRERO |    | MARZO |    | ABRIL |    | MAYO |    | JUNIO |    | JULIO |    | AGO |    | SEPTIEMBRE |    | OCTUBRE |    | NOVIEMBRE |    | DICIEMBRE |    |  |  |  |  |  |  |
|--------------|--------------|--------------------|------|-----|----|------|----|-------|----|---------|----|-------|----|-------|----|------|----|-------|----|-------|----|-----|----|------------|----|---------|----|-----------|----|-----------|----|--|--|--|--|--|--|
|              |              | HA                 | HA   | HA  | HA | HA   | HA | HA    | HA | HA      | HA | HA    | HA | HA    | HA | HA   | HA | HA    | HA | HA    | HA | HA  | HA | HA         | HA | HA      | HA | HA        | HA | HA        | HA |  |  |  |  |  |  |
| BOGOTÁ       | BOGOTÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOGOTÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOGOTÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOGOTÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
| BOYACÁ       | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | BOYACÁ       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
| CUNDINAMARCA | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CUNDINAMARCA | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
| CAJAMAZUZA   | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CAJAMAZUZA   | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
| CANTÓN       | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |
|              | CANTÓN       | 1070               | 1070 |     |    |      |    |       |    |         |    |       |    |       |    |      |    |       |    |       |    |     |    |            |    |         |    |           |    |           |    |  |  |  |  |  |  |

Table 1  
**TOTAL AREA**  
**Sprayed for Illicit Coca-Leaf Crops**  
**Period November 1-30, 2003**  
**Total Area Sprayed (Months January-December)**  
**Departamento = Department**  
**Municipio: Municipality**



| DEPARTAMENTO | MUNICIPIO           | TOTAL AREA ASPERJUNA |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------|---------------------|----------------------|----------|----------|----------|---------|---------|----------|----------|---------|----------|---------|------|--|--|--|--|--|--|--|--|--|--|--|--|--|
|              |                     | ENE                  | FEB      | MAR      | ABR      | MAY     | JUN     | JUL      | AGO      | SEPT    | OCT      | NOV     | DIC  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CAUCA        | El Valle (San José) | 384.10               | 129.87   | 57.95    | 232.28   | 31.68   |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | Yaspí (San José)    | 331.74               | 131.74   | 301.13   | 407.81   | 7.75    |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 234.17               | 35.10    | 121.01   | 179.54   | 19.78   |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 407.81               |          | 710.71   | 611.42   | 135.40  |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 411.31               |          | 191.80   | 219.77   |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 433.81               |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 31.98                |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 341.54               |          |          | 311.34   | 311.60  |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 285.11               |          |          | 172.35   | 311.44  |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 781.01               |          |          |          | 311.77  |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 1193.19              | 114.13   | 318.12   | 223.54   | 251.10  |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
|              | El Valle            | 3757.23              | 112.65   | 422.19   | 4183.15  | 3118.44 |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 141.37              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 784.71              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 307.84              |                      | 328.87   |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 591.15              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 261.09              |                      |          | 149.88   | 17.70    |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 153.77              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 845.31              |                      | 78.27    |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 3153.32             | 121.09               | 0.00     | 315.78   | 17.70    | 77.11   |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 59.17               | 59.12                |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 1177.17             | 311.31               |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 54.65               | 47.51                |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 632.44              | 122.64               | 125.00   | 331.00   |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 8.24                |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 31.15               |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 1313.23             | 218.00               | 225.00   | 0.00     | 0.00     | 0.00    |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 540.43              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 14.71               |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 493.17              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 199.65              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 37.65               |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 233.70              | 7.51                 |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 102.93              |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 41.53               |                      |          |          |          |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 314.20              | 1.91                 | 0.00     | 0.00     | 0.00     |         |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 177.50              | 0.00                 | 0.00     | 0.00     | 0.00     | 0.00    |         |          |          |         |          |         |      |  |  |  |  |  |  |  |  |  |  |  |  |  |
| El Valle     | 121.51.29           | 16477.66             | 15085.51 | 16916.30 | 12718.35 | 5714.66 | 8749.84 | 15000.72 | 16111.00 | 7733.41 | 10133.55 | 6288.27 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |

El Valle, 31 de Noviembre de 2001.

Key (untitled page): See Table 1

**TABLA 2**  
**TOTAL AREA ASPERADA DE CULTIVOS ILICITOS DE AMAPOLA**  
**PERIODO ENERO - DICIEMBRE 2003**

| DEPARTAMENTO | MUNICIPIO  | TOTAL AREA ASPERADA |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|--------------|------------|---------------------|---------|--------|--------|------|-------|--------|--------|------------|---------|-----------|-----------|------|------|------|------|------|------|------|------|------|------|------|--|
|              |            | ENERO               | FEBRERO | MARZO  | ABRIL  | MAYO | JUNIO | JULIO  | AGOSTO | SEPTIEMBRE | OCTUBRE | NOVIEMBRE | DICIEMBRE |      |      |      |      |      |      |      |      |      |      |      |  |
| BOYACA       | San Carlos | 324.4               | 171.91  |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Upará      | 114.9               | 43.25   |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Upará      | 141.71              | 33.74   |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Belmonte   | 141.00              |         |        | 0.00   |      |       |        | 7.0    |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Paraná     | 557.57              | 41.11   | 0.00   | 0.00   | 0.00 | 0.00  | 0.00   | 713.13 | 0.00       | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |      |  |
|              | Sonsón     | 483.31              | 45.59   |        | 15.00  |      |       |        |        | 41.52      |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Sonsón     | 472.31              | 43.39   | 0.00   | 11.00  | 0.00 |       |        | 4.82   |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Sonsón     | 135                 |         |        |        |      |       |        | 151    |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Sonsón     | 111.83              |         |        |        |      |       |        | 11.82  |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Sonsón     | 48.14               |         | 25.30  |        |      |       |        | 71.14  |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
| CAUCA        | Armenia    | 2.4                 |         |        |        |      |       | 3.81   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 75.4                |         |        |        |      |       | 7.26   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 43.60               |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 16.11               |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 14.11               |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 2.44                |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 253                 |         |        |        |      |       |        |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 122.01              | 0.00    | 0.00   | 0.00   | 0.00 | 0.00  | 0.00   | 0.00   | 0.00       | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
|              | Armenia    | 11.00               |         |        |        |      |       |        | 11.00  |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 24.11               |         |        |        |      |       |        | 81.25  |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
| CUNDINAMARCA | Armenia    | 46.21               |         |        |        |      |       | 25.05  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 20.17               |         |        |        |      |       | 7.94   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 20.11               |         |        |        |      |       | 0.59   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 24.11               |         |        |        |      |       | 15.11  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 11.00               |         |        |        |      |       | 3.00   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 43.04               | 0.00    | 0.00   | 0.00   | 0.00 | 0.00  | 0.00   | 0.00   | 0.00       | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |      |  |
|              | Armenia    | 13.07               |         |        |        |      |       | 3.00   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 34.00               |         |        |        |      |       | 34.00  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 72.11               |         |        |        |      |       | 4.00   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 50.12               |         |        |        |      |       | 50.12  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
| HUILA        | Armenia    | 43.4                |         |        |        |      |       | 43.4   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 5.1                 |         |        |        |      |       | 5.1    |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 4.5                 |         |        |        |      |       | 4.5    |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 22.71               | 0.00    | 0.00   | 0.00   | 0.00 | 0.00  | 0.00   | 0.00   | 0.00       | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |      |  |
|              | Armenia    | 21.36               |         |        |        |      |       | 25.59  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 24.77               |         |        |        |      |       | 10.00  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 11.11               |         |        |        |      |       | 15.00  |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 4.11                |         |        |        |      |       | 8.11   |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 3.3                 |         |        |        |      |       | 3.3    |        |            |         |           |           |      |      |      |      |      |      |      |      |      |      |      |  |
|              | Armenia    | 71.37               | 0.00    | 0.00   | 11.00  | 0.00 | 0.00  | 0.00   | 0.00   | 0.00       | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |      |  |
| TOTAL        | 2527.11    | 457.00              | 0.00    | 711.00 | 483.40 | 0.00 | 0.00  | 261.11 | 324.17 | 231.13     | 0.00    | 0.00      | 0.00      | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |      |  |

Elaboración: SGA de Boyacá de 2003

**Key to Table 2**  
**TOTAL AREA SPRAYED WITH ILLICIT COCA-LEAF CROPS**  
**PERIOD JANUARY-DECEMBER 2003**  
**Total sprayed. (months of the year)**

### **3. EVALUATION OF ENVIRONMENTAL MANAGEMENT AND CONTROL IN PECIG.**

On November 7, officers of DIRAN, NAS, Dyncorp and DNE-Environmental Audit reviewed the programming and activities to be undertaken in verifying the effectiveness of aerial spraying with glyphosate, and the efficiency and effectiveness of environmental management measures.

Based on field observations obtained in the process of verifying on coca- leaf crops sprayed in January-October, 2003, it was recommended that this kind of activity should be scheduled more often, given the high level dynamics and changes occurring in the illicit crop zones.

PECIG has good tools (satellite images, videos, photographs, aircraft), which can be used to obtain additional information on environmental impact of the program, and information about illicit crops.

### **VERIFICATION OF COMPLAINTS.**

On November 27, 2003, officers of DIRAN and DNE effected verifications on complaints in the Department of Guaviare.

#### **4. DOCUMENTATION FOR REFERENCE, EVIDENCE AND ANNEXES.**

This Chapter refers to documents consulted, some of which are attached, in the course of work on the Environmental Audit of the follow-up to activities in the Program for the Eradication of Illicit Crops by Aerial Spraying in the period November 1-30, 2003.

##### **Follow-up of social management.**

- The database "Complaints processed in compliance with Resolution 017/October 4, 2001." ARECI -DNE (consulted)

##### **Follow-up on aerial spraying operations.**

- Weekly report on spraying activities-magnetic records from DelNorte on missions in the year 2003 (consulted)
- Antinarcotics Police Polygrams-records data and events, ARECI operations bases (consulted)

##### **Notes of record.**

- Note of record for the technical verification of the effectiveness of spraying activities on coca-leaf crops and side-effects on the environment during 2003 in the Departments of Nariño, Putumayo, Guaviare, Norte de Santander and Antioquia. For the period November 11-25, 2003. The National Police-Antinarcotics Directorate-Eradication of Illicit Crops Area.

NATIONAL POLICE.  
ANTINARCOTICS DIRECTORATE.  
AREA FOR THE ERADICATION OF ILLICIT CROPS.  
NOTE OF RECORD No. .... FOR THE TECHNICAL VERIFICATION OF THE  
EFFECTIVENESS OF SPRAYING OPERATIONS ON COCA LEAF CROPS AND  
THE COLLATERAL EFFECTS ON THE ENVIRONMENT DURING 2003 IN THE  
DEPARTMENTS OF NARIÑO, PUTUMAYO, GUAVIARE, NORTE DE  
SANTANDER AND ANTIOQUIA.

On 11 November, 2003, activities began in relation to the verification of spraying of illicit coca leaf crops with glyphosate in the period January 1-October 31, 2003, and the following nuclei were verified.

1. Nariño nucleus. November 12, 2003, 16 points verified.
2. Putumayo nucleus. November 14-15, 2003, 41 points verified.
3. Arauca nucleus. November 19, 2003-17 points verified.
5. Norte de Santander nucleus: November 20-22, 2003, 30 points verified.
6. Antioquia nucleus. November 24, 2003, 31 points verified.
7. 26 soil samples were taken at the various nucleus nuclei verified, and these were delivered to the NAS office to be sent to the laboratories for analysis.

Continuation of NOTE OF RECORD No. .... FOR THE TECHNICAL VERIFICATION OF THE EFFECTIVENESS OF SPRAYING OPERATIONS ON COCA LEAF CROPS AND THE COLLATERAL EFFECTS ON THE ENVIRONMENT DURING 2003 IN THE DEPARTMENTS OF NARIÑO, PUTUMAYO, GUAVIARE, NORTE DE SANTANDER AND ANTIOQUIA.

In the process of evaluation of the program for the eradication of illicit coca leaf crops, the following officers took part:

|  |   |
|--|---|
|  | Elmer Cardozo.<br>Representative Ministry of the Environment. |
| Gustavo Vargas.<br>Representative of NAS | Jairo Pérez<br>Environmental Auditor                          |
| Alberto Rosero<br>ICA Representative     | Herber Mateus<br>ICA Representative                           |

Lieutenant-Colonel Miguel Antonio Tunjano-Villarraga  
Coordinator, Verification Group (ARECI)

Lieutenant-Colonel Carlos Arturo Narváez-Martínez.  
Head of the Illicit Crops Eradication Area.

## **5. RECOMMENDATIONS.**

Based on information collected in the forms and activities indicated in the Environmental Management Plan, we have some recommendations for each Record.

**Operations base at San Jose del Guaviare (Guaviare), mobile base at Apiay (Meta), and mobile base at Tame (Arauca)**

The recommendations given apply to all bases currently operating in Colombia.

### **Spraying operations management programs.**

- It is recommended that the small plots (under 2 ha) be sprayed for more than 90% of that area, since the strategy of spraying by passes or isolated lines over long lapses of time (1-2 weeks), allows the grower to prune them (cut the stem), or harvest (collect the leaves) the crop. In these circumstances, the next spraying passes will be useless, since there will be no foliage area to assimilate the herbicide.

### **Industrial safety management program at operations bases.**

- This should guarantee the perfect functioning of industrial safety measures ordered to control potential fuel and herbicide spills, especially at Mobile Bases.

### **Solid waste management program.**

- Implement records for the follow-up of activities required by Instruction Sheet 3.

### **Wastewater Management Program at PECIG Bases.**

- Implement records for the follow-up of activities required by Instruction Sheet 4.
- Implement the recycling system in order to provide appropriate management

for water contaminated by agrochemicals (from washing aircraft, equipment and receptacles)

**Communications and social management program.**

- Continue with the process of verification and is settlement of complaints, as required by Resolution 17/2001.

**Contingency plan program.**

- Continue work on the Contingency Report form (Apiay- Meta- Mobile Base).



## 6. SUMMARY

With regard to spraying operations in the period November 1-30, 2003 in the Provinces of Arauca (Araquita, Puerto Rondón and Tame). Guaviare (San José del Guaviare), Meta /La Uribe. Mesetas, Maparipán, Puerto Concordia, Puerto Lleras, Puerto Rico and Vista Hermosa) 6268.27 ha of illicit coca crops sprayed were reported, for a cumulated total this year of 124,531.29 ha sprayed.

In this period, no illicit poppy crops were sprayed.

During November 11-26, 2003, there was a verification of the illegal coca crops of sprayed between January and October 2003 in the Provinces of Nariño. Putumayo, Guaviare, Arauca, Norte de Santander and Antioquia. Officials from the Ministry of Environment, Housing and Regional Development, ICA, NAS, the Antinarcotics Police and the National Narcotics Directorate-Environmental Audit took part in this verification.

The overall weighted average effectiveness of aerial spraying with glyphosate herbicide was established to be 90.4%.

# ATTACHMENTS

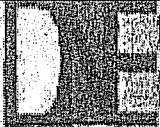
EMP FORMS

PECIG ENVIRONMENTAL AUDIT

ANTINARCOTICS AIRBASE SAN JOSÉ DEL GUAVIARE

EMP – FORMS

ENVIRONMENTAL AUDIT

|   |      |  |          |
|---|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN          | Page 1/8 |
|   | RF1  | Spraying Operations Management Program |          |

|              |                |          |     |      |              |      |                       |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

**GENERAL EVALUATION**  
(Complete this form for each operations base)

**Period of evaluation (monthly)**

From 01/11/03 To 30/11/03

Coordinates of area  
Sprayed in this evaluation

| N          | S          | E          | W          |
|------------|------------|------------|------------|
| 02°49'46'' | 02°25'20'' | 72°39'54'' | 72°43'37'' |
| 02°49'55'' | 02°25'55'' | 72°36'01'' | 72°39'36'' |

Area sprayed  
Municipalities sprayed from this  
base

1.697,33 ha  
San José de Guaviare (Meta)

Mapirípan, Puerto Concordia, Puerto Rico (Meta)  
Guaviare y Meta

Departments

**2 DATA OF OPERATIONS BASE**

- 2,1 Base name Antinarcotics airbase San José del Guaviare  
 2,2 Adjoining San José del Guaviare airport  
 \* Municipality San José del Guaviare  
 \*Department Guaviare  
 2,3 Base CO Capt Augusto Amador Villegas, Maj., Jorge Alexander Gallego-Chávez,  
 Maj. Luis Enrique Méndez-Reina  
 2,4 Responsible for Environmental Mgmt Capt Miguel Antonio Tunjano

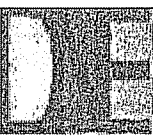
**3 EMPLOYMENT INFORMATION**

- 3,1 Days operation in the period 14  
 3,2 Days poor conditions preventing spraying 8  
 3,3 Days of aircraft maintenance 2  
 3,4 Other types of day 6 activities suspended

**4 GENERAL INFORMATION ON MISSIONS**

- 4,1 No of missions in period 88  
 4,2 No. of spraying records raised in period 14  
 4,3 No. of invitations sent to civilian authorities 0  
 4,4 Frequency of attendance of civilian authorities and control bodies to PECIG in period

| Officer's name | Entity | Post | Participation in missions |
|----------------|--------|------|---------------------------|
|                |        |      |                           |
|                |        |      |                           |



MPMA

## ENVIRONMENTAL MANAGEMENT PLAN

Page 2/8

RF1

## Spraying Operations Management Program

Sheet 1

| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|---------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name          |          |     |      | Professional | Name | San José del Guaviare |  |
| Env Audit    | Jairo E Perez |          |     |      |              |      | Consec                |  |

## GENERAL EVALUATION

## NO. OF FLIGHTS

|   |   |   |
|---|---|---|
| 1 | No of detection flights in period                   | Spray pilots effect weekly reconnaissance flights |
| 2 | No. of spraying flights                             | 88  |
| 3 | No. of flights to determine crops prior to spraying | 22  |

\*The process includes satellite detection, air detection, geo-referencing of projects and verification of images, photos and other kinds of information

|   |                                  |
|---|----------------------------------|
| 4 | No. of flights cancelled due to: |
|   | Atmospheric conditions _____     |
|   | Technical reasons _____          |
|   | Harassment _____                 |
|   | Pilot's decision _____           |
|   | Other (what?) _____              |

## DETECTION OF ILLICIT CROPS

## TYPES OF IMAGE USED TO DETECT NUCLEUS EVALUATED BY SATELLITE

| Type | Path-Row | Date | Resolution | Region/Nucleus | No. of missions |
|------|----------|------|------------|----------------|-----------------|
|      |          |      |            |                |                 |
|      |          |      |            |                |                 |

## AERIAL PHOTOGRAPHY

| Type | Flight No. | Photo no. | Date | Scale | No of missions |
|------|------------|-----------|------|-------|----------------|
|      |            |           |      |       |                |

## CARTOGRAPHY

| Type | No. | Date | Scale | Region/nucleus | No. of missions |
|------|-----|------|-------|----------------|-----------------|
|      |     |      |       |                |                 |

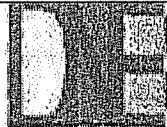
## OVERFLIGHT

Indicate dates of detection in Nucleus Evaluated

| Date | Participants | Objective | Coordinates | No of missions |
|------|--------------|-----------|-------------|----------------|
|      |              |           |             |                |

## AUDIOVISUAL SUPPORT

| MISSIONS | Photos      |              | Videos |      |
|----------|-------------|--------------|--------|------|
|          | Album title | No of photos | Code   | Date |
|          |             |              |        |      |

|   |                |                                     |     |      |              |      |                       |
|---|----------------|-------------------------------------|-----|------|--------------|------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN       |     |      | Page 3/8     |      |                       |
|   | RF1            | Spraying operations management plan |     |      | Sheet 1      |      |                       |
| COMPLETION  |                | REVISION                            | No. | DATE | APPROVAL     | BASE |                       |
| Professional  | Name           |                                     |     |      | Professional | Name | San José del Guaviare |
| Env Audit   | Jairo E. Perez |                                     |     |      |              |      | Consec                |

### GENERAL EVALUATION

#### 6.3 ENVIRONMENTAL ZONING OF SPRAYING OPERATIONS

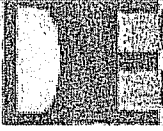
| AREAS ZONED   | Name   | Surface |    | Environmental treatment given |
|---|--|---------|----|-------------------------------|
|   |  | Ha      | %* |                               |
| Ecologically fragile<br>Nature Park   | Sierra de la Macarena  | 629280  |    | Exclusion                     |
|   | Nukak Macu Nature Reserve  | 855000  |    | Exclusion                     |
| Culturally fragile<br>Indigenous reservations                                     | Caño Negro (Panure)  | 1833    |    |                               |
|   | Venezuela  | 303     |    |                               |
|   | Barrancón  | 803     |    |                               |
|   | La Fuga  | 2500    |    |                               |
|   | Barranco Ceiba y Laguna Araguato   | 8360    |    |                               |
| Archaeological parks  |  |         |    |                               |
| Historic monuments  | Ciudad de Piedra   | ND      |    | Exclusion                     |
| Environmentally sensitive   |  |         |    |                               |
|   | R Guayabero, R Cafre.  | ND      |    | Exclusion                     |
| Bodies of water R Rivers<br>Q: Streams H: Wetlands<br>La: Lagoons L: Lakes        | C. Mosco, C El Deslinde, VC El Agrado, C. Macú   | ND      |    | Exclusion                     |
|   | Wells La Rebeca, La Choquita, La Maria, La. Negra  | ND      |    | Exclusion                     |
| Native forest   |  |         |    |                               |
| Socially sensitive<br>Agglomerated human settlements (towns, villages, hamlets)** | San Jose del Guaviare (M), Resbalón, Puerto Ospina, Elk Capricho, Mapiripan (M), El Agrado, San Lorenzo, Puerto Concordia (M), Sabanas La Sal., El Ultimo Intento, Puerto Rico (M), El Dorado, El Reposo | ND      |    | Exclusion                     |

\*% of total block area

\*\* State whether Cgto: Corregidor District, Cas: Hamlet, Insp Pol: Police District, M: Municipality. O: Other

ENVIRONMENTAL ZONING (continued)

| AREAS ZONED   | Name  | Surface |   | Environmental treatment |
|---|---|---------|---|-------------------------|
|   |   | Ha      | % |                         |
| Economically sensitive:<br>Infrastructure works:<br>roads, airports, river,<br>ports, seaports, dams,<br>power stations | San Jose del Guaviare airport, Eje Calamar-El retorno-San José del Guaviare | ND      |   | Exclusion               |

|  |      |                                     |          |
|--|------|-------------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN       | Page 4/8 |
|  | RF1  | Spraying operations management plan | Sheet 1  |

| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE                  |
|--------------|---------------|----------|-----|------|--------------|------|-----------------------|
| Professional | Name          |          |     |      | Professional | Name | San José del Guaviare |
| Env Audit    | Jairo-E.Perez |          |     |      |              |      | Consec                |

### GENERAL EVALUATION

|   |  |  |    |           |
|---|--|--|----|-----------|
| Manual eradication agreements           |  |  |    |           |
| Alt Devpt Plan Productive Project areas |  |  | ND | Exclusion |
| Irrigation/drainage areas               |  |  |    |           |
| Industrial zones                        |  |  |    |           |
| Opencast mining operations              |  |  |    |           |
| Rural commercial tourism complexes      |  |  | ND | Exclusion |
| Rural institutional complexes           |  |  |    |           |
| Environmental exclusion areas           |  |  | ND |           |
| Total zoning areas                      |  |  | ND |           |

ND: No information available

#### 4 ANALYSIS OF SPRAYING RECORDS (attached)

Glyphosate spraying area records are as follows:

#### 5 GENERAL INFORMATION ON SPRAYING

|  |   |
|--|---|
| Are there spraying manuals at the operations base?   | YES   |
| Are there support escort for spray aircraft manuals at base  | YES   |
| Frequency of aircraft spraying equipment   | Mandatory every 50 and 100 hrs or if damage appears in the system |
| Frequency of general washing of spraying equipment   | Every 8 days, when required by blockage of nozzles                |
| Frequency of calibration of spraying equipment   | Daily   |
| Are planning and evaluation meetings held  | YES   |
| No of training classes during the period for operators (stores, tanks) participating in operations | 0   |
| No of polygrams recorded during period   | 30  |
| No of records of spraying operations during period   | 14  |
| No of DeI Norte recordings   | Valid 88<br>Failed/malfunction                                    |
| Does pilot know processes, rules, restrictions on spraying processes?                              | Yes   |
| Does pilot know environmental effects of PECIG substances applied?                                 | Yes   |
| Does pilot know effects on human and animal health of PECIG substances applied ?                   | Yes   |

RECORD OF ILLICIT COCA-LEAF CROPS  
MOBILE BASE, APLAY, META.....  
PERIOD NOVEMBER 1-30, 2003

| No. | MISION   | AREA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>REPORTE (gal) | DEPARTAMENTO    | MUNICIPIO                                | OBSERVACIONES |
|-----|----------|---------------------------|--|-----------------|--|---------------|
| 1   | K083IMAC | 12,08                     | 30,8   | GUAVIARE        | San José del Guaviare                    |               |
| 2   | K083YUAC | 13,63                     | 30,8   | GUAVIARE        | San José del Guaviare                    |               |
| 3   | K083WLAC | 7,15                      | 22,0   | GUAVIARE        | San José del Guaviare                    |               |
| 4   | K093IMAC | 3,33                      | 8,8  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 5   | K093YUAC | 3,17                      | 8,8  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 6   | K093W8AC | 3,65                      | 8,8  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 7   | K093R_AC | 2,20                      | 6,6  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 8   | K113UMAC | 36,94                     | 101,2  | META            | Puerto Concordia                         |               |
| 9   | K113YUAC | 29,84                     | 79,2   | META            | Puerto Concordia                         |               |
| 10  | K113TBAC | 40,35                     | 105,6  | META            | Puerto Concordia                         |               |
| 11  | K113LAC  | 35,06                     | 92,4   | META            | Puerto Concordia                         |               |
| 12  | K113R^AC | 22,46                     | 70,4   | META            | Puerto Concordia                         |               |
| 13  | K123YUAC | 39,48                     | 105,6  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 14  | K123YUBC | 10,93                     | 30,8   | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 15  | K123TBAC | 40,42                     | 110,0  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 16  | K123T8BC | 10,62                     | 30,8   | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 17  | K123UNAC | 38,39                     | 110,0  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |

Key

Misión  
Area asperjada  
Herbicida gastado según reporte (gal)  
Departamento  
Municipio  
Observaciones

Mission  
Area sprayed  
Herbicide used (per report) (gal)  
Department  
Municipality  
Comments



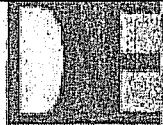
| No. | MISION   | AREA ASPERJADA (ha) | HERBICIDA GASTADO SEGUN REPORTE (g/l) | DEPARTAMENTO    | MUNICIPIO                                | OBSERVACIONES |
|-----|----------|---------------------|---------------------------------------|-----------------|--|---------------|
| 18  | K123UNBC | 8,94                | 22,0                                  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 19  | K123XLAC | 26,35               | 74,8                                  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 20  | K123XLBC | 11,63               | 33,0                                  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 21  | K123I AC | 30,49               | 92,4                                  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 22  | K123I BC | 8,45                | 22,0                                  | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 23  | K123R^BC | 2,50                | 6,6                                   | GUAVIARE - META | Puerto Concordia - San José del Guaviare |               |
| 24  | K133YUAC | 40,32               | 110,0                                 | META            | Puerto Concordia                         |               |
| 25  | K133YUBC | 41,58               | 110,0                                 | GUAVIARE        | San José del Guaviare                    |               |
| 26  | K133YUCC | 10,10               | 26,4                                  | META            | Puerto Concordia                         |               |
| 27  | K133XLBC | 35,23               | 101,2                                 | GUAVIARE        | San José del Guaviare                    |               |
| 28  | K133XLCC | 10,30               | 30,8                                  | META            | Puerto Concordia                         |               |
| 29  | K133R^AC | 32,75               | 96,8                                  | META            | Puerto Concordia                         |               |
| 30  | K133R^BC | 35,15               | 105,6                                 | GUAVIARE        | San José del Guaviare                    |               |
| 31  | K133R^CC | 10,96               | 33,0                                  | META            | Puerto Concordia                         |               |
| 32  | K133UMAC | 40,68               | 110,0                                 | META            | Puerto Concordia                         |               |
| 33  | K133UMBC | 40,89               | 110,0                                 | GUAVIARE        | San José del Guaviare                    |               |
| 34  | K133UMCC | 9,62                | 26,4                                  | META            | Puerto Concordia                         |               |
| 35  | K133T AC | 40,28               | 110,0                                 | META            | Puerto Concordia                         |               |
| 36  | K133T BC | 44,27               | 110,0                                 | GUAVIARE        | San José del Guaviare                    |               |
| 37  | K133T CC | 14,02               | 39,6                                  | META            | Puerto Concordia                         |               |
| 38  | K153YUAC | 4,44                | 11,0                                  | META            | Puerto Concordia                         |               |
| 39  | K153INAC | 8,47                | 22,0                                  | META            | Puerto Concordia                         |               |
| 40  | K153XLAC | 4,53                | 13,2                                  | META            | Puerto Concordia                         |               |
| 41  | K153R^AC | 3,24                | 13,2                                  | META            | Puerto Concordia                         |               |
| 42  | K153T8AC | 4,83                | 13,2                                  | META            | Puerto Concordia                         |               |
| 43  | K153UMAC | 2,98                | 8,8                                   | META            | Puerto Concordia                         |               |

Key: see previous page

| Nº. | MISION   | AREA ASPERJADA (ha) | HERBICIDA GASTADO SEGUN REPORTE (lit) | DEPARTAMENTO    | MUNICIPIO                         | OBSERVACIONES |
|-----|----------|---------------------|---------------------------------------|-----------------|-----------------------------------|---------------|
| 44  | K163YUAC | 27,37               | 74,8                                  | META            | Mapiripán - Puerto Concordia      |               |
| 45  | K163JLAC | 32,01               | 88,0                                  | META            | Mapiripán - Puerto Concordia      |               |
| 46  | K163T^AC | 35,18               | 99,0                                  | META            | Mapiripán - Puerto Concordia      |               |
| 47  | K163X^AC | 28,23               | 79,2                                  | META            | Mapiripán - Puerto Concordia      |               |
| 48  | K163UMAC | 18,89               | 52,8                                  | META            | Mapiripán - Puerto Concordia      |               |
| 49  | K173W^AC | 11,12               | 29,0                                  | META            | Puerto Concordia                  |               |
| 50  | K173XUAC | 5,85                | 17,6                                  | META            | Puerto Concordia                  |               |
| 51  | K183T^AC | 3,08                | 7,9                                   | GUAVIARE        | San José del Guaviare             |               |
| 52  | K183YUAC | 4,06                | 12,3                                  | GUAVIARE        | San José del Guaviare             |               |
| 53  | K183WLAC | 1,70                | 4,8                                   | GUAVIARE - META | Mapiripán - San José del Guaviare |               |
| 54  | K183UMAC | 1,85                | 5,3                                   | GUAVIARE        | San José del Guaviare             |               |
| 55  | K183X8AC | 4,18                | 11,4                                  | GUAVIARE - META | Mapiripán - San José del Guaviare |               |
| 56  | K233X2AC | 1,83                | 5,3                                   | GUAVIARE - META | Mapiripán - San José del Guaviare |               |
| 57  | K233X28C | 39,11               | 106,5                                 | GUAVIARE        | San José del Guaviare             |               |
| 58  | K233USAC | 3,19                | 8,8                                   | GUAVIARE - META | Mapiripán - San José del Guaviare |               |
| 59  | K233US8C | 37,19               | 100,8                                 | GUAVIARE        | San José del Guaviare             |               |
| 60  | K233Y6AC | 2,03                | 5,7                                   | GUAVIARE        | San José del Guaviare             |               |
| 61  | K233Y68C | 38,84               | 105,2                                 | GUAVIARE        | San José del Guaviare             |               |
| 62  | K233W4AC | 2,71                | 8,4                                   | GUAVIARE - META | Mapiripán - San José del Guaviare |               |
| 63  | K233W48C | 34,39               | 92,0                                  | GUAVIARE        | San José del Guaviare             |               |
| 64  | K233TAAC | 5,58                | 19,8                                  | GUAVIARE - META | Mapiripán - San José del Guaviare |               |

| No.       | MISION   | AREA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>REPORTE (dl) | DEPARTAMENTO    | MUNICIPIO                         | OBSERVACIONES |
|-----------|----------|---------------------------|---|-----------------|-----------------------------------|---------------|
| 65        | K233RHAC | 4,16                      | 4,5   | GUAVIARE - META | Mapiripan - San José del Guaviare |               |
| 66        | K233RHBC | 39,89                     | 106,9   | GUAVIARE        | San José del Guaviare             |               |
| 67        | K263IHAC | 8,22                      | 21,1  | META            | Puerto Rico                       |               |
| 68        | K263X2AC | 3,96                      | 11,0  | META            | Puerto Rico                       |               |
| 69        | K263YGAC | 7,20                      | 18,0  | META            | Puerto Rico                       |               |
| 70        | K263TAAC | 8,18                      | 21,6  | META            | Puerto Rico                       |               |
| 71        | K263W4AC | 6,83                      | 25,5  | META            | Puerto Rico                       |               |
| 72        | K273W4BC | 37,78                     | 103,4   | GUAVIARE        | San José del Guaviare             |               |
| 73        | K273YGAC | 40,22                     | 107,4   | GUAVIARE        | San José del Guaviare             |               |
| 74        | K273UAAC | 33,53                     | 92,4  | GUAVIARE        | San José del Guaviare             |               |
| 75        | K273IHAC | 31,14                     | 83,2  | GUAVIARE        | San José del Guaviare             |               |
| 76        | K273X2AC | 33,03                     | 88,9  | GUAVIARE        | San José del Guaviare             |               |
| 77        | K293W4AC | 0,90                      | 2,6   | GUAVIARE        | San José del Guaviare             |               |
| 78        | K293W4BC | 51,28                     | 117,9   | GUAVIARE        | San José del Guaviare             |               |
| 79        | K293X2AC | 3,41                      | 9,7   | GUAVIARE        | San José del Guaviare             |               |
| 80        | K293X2BC | 38,57                     | 100,3   | GUAVIARE        | San José del Guaviare             |               |
| 81        | K293USBC | 41,85                     | 112,2   | GUAVIARE        | San José del Guaviare             |               |
| 82        | K293YGAC | 4,85                      | 13,6  | GUAVIARE        | San José del Guaviare             |               |
| 83        | K293YGBC | 36,94                     | 96,4  | GUAVIARE        | San José del Guaviare             |               |
| 84        | K293THAC | 1,70                      | 4,8   | GUAVIARE        | San José del Guaviare             |               |
| 85        | K293THBC | 42,27                     | 113,1   | GUAVIARE        | San José del Guaviare             |               |
| 86        | K303YGAC | 2,75                      | 9,2   | META            | Puerto Rico                       |               |
| 87        | K303W4AC | 3,14                      | 8,4   | META            | Puerto Rico                       |               |
| 88        | K303THAC | 4,45                      | 15,4  | META            | Puerto Rico                       |               |
| <b>88</b> |          | <b>1697,33</b>            | <b>4626,73</b>                                |                 |                                   |               |

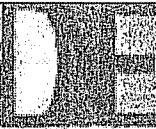
Key: see previous page

|   |                |  |     |          |              |      |                       |
|---|----------------|--|-----|----------|--------------|------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN          |     | Page 5/8 |              |      |                       |
|   | RF1            | Spraying operations management program |     |          |              |      |                       |
| COMPLETION  |                | REVISION                               | No. | DATE     | APPROVAL     | BASE |                       |
| Professional  | Name           |  |     |          | Professional | Name | San José del Guaviare |
| Env. Audit  | Jairo E. Perez |  |     |          |              |      | Consec                |

### GENERAL EVALUATION

#### 7 CLIMATIC DATA FOR SPRAYING IN THE PERIOD (November 2003)

| Days | Operation type | TEMPERATURE<br>°C | Rel. Humidity | WINDS | Hours<br>application | Comments                           |
|------|----------------|-------------------|---------------|-------|----------------------|------------------------------------|
| 1    | No operation   |                   |               |       |                      | Activities suspended               |
| 2    | No operation   |                   |               |       |                      | Activities suspended               |
| 3    | No operation   |                   |               |       |                      | Activities suspended               |
| 4    | No operation   |                   |               |       |                      | Activities suspended               |
| 5    | No operation   |                   |               |       |                      | Activities suspended               |
| 6    | No operation   |                   |               |       |                      | Reactivation of operations base    |
| 7    | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 8    | Spraying       | ND                | ND            | ND    |                      |                                    |
| 9    | Spraying       | ND                | ND            | ND    |                      |                                    |
| 10   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 11   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 12   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 13   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 14   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 15   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 16   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 17   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 18   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 19   | No operation   |                   |               |       |                      | Preventive maintenance of aircraft |
| 20   | No operation   |                   |               |       |                      | Preventive maintenance of aircraft |
| 21   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 22   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 23   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 24   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 25   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 26   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 27   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 28   | No operation   |                   |               |       |                      | Poor atmospheric conditions        |
| 29   | Spraying       | ND                | ND            | ND    |                      |                                    |
| 30   | Spraying       | ND                | ND            | ND    |                      |                                    |

|  |      |  |          |
|--|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN          | Page 6/8 |
|  | RF1  | Spraying operations management program | Sheet 1  |

|              |               |          |     |      |              |      |                       |  |
|--------------|---------------|----------|-----|------|--------------|------|-----------------------|--|
| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
| Professional | Name          |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. Audit   | Jairo E.Perez |          |     |      |              |      | Consec                |  |

### CONSOLIDATED SPRAYING AREAS DURING THE PERIOD (November 2003)

| Department   | Municipalities        | Inspection / Corregidor district        | Area (ha) of coca | Aircraft PNC No.   | Comments |
|--------------|-----------------------|---|-------------------|--|----------|
| Guaviare     | San José del Guaviare | El Resbalón, Puerto Ospina, El Capricho | 952.64            | 3040 - 3041 -<br>3042 - 3043 -<br>3045                         |          |
| Meta         | Mapiripán             | El Agrado, San Lorenzo                  | 17.15             | 3040 - 3042 -<br>3043 - 3045                                   |          |
| Meta         | Puerto Concordia      | Sabanas La Sal, El Ultimo Intento       | 693.15            | 3040 - 3041 -<br>3042 - 3043 -<br>3045 - 3046 -<br>3047 - 4050 |          |
| Meta         | Puerto Rico           | El Dorado, El Reposo.                   | 34.39             | 3040 - 3041 -<br>3042 - 3043 -<br>3045 - 3046 -<br>3047 - 4050 |          |
| <b>TOTAL</b> |                       |   | <b>1.697.33</b>   |  |          |

#### COMMENTS

The helicopter PNC 0712 was hit by gunfire on November 23

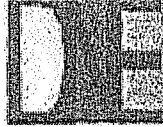
#### 0 CROP SPRAYING

1 Type of crop sprayed-COCA-LEAF

2 Type of aircraft used OV10

#### 3 Operating parameters (Average for the period)

| Parameter                       | Unit         | Value/range | Verification |
|---------------------------------|--------------|-------------|--------------|
| FLIGHT ALTITUDE                 | M            | <75         | 173.12 asl   |
| Dosage                          | l/ha         | 10.4        | 10.4         |
| Wind speed                      | Knots        | <2          | ND           |
| Airspeed                        | MPH          | <150        |              |
| Drift                           | Knots (OV10) | <180        | 204.5        |
| Compliance with exclusion zones |              | <5          | <5           |

|   |               |  |     |      |              |                       |
|---|---------------|--|-----|------|--------------|-----------------------|
|  | MPMA          | ENVIRONMENTAL MANAGEMENT PLAN          |     |      | Page 7/8     |                       |
|   | RF1           | Spraying operations management program |     |      | Sheet 1      |                       |
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| Env- Audit  | Jairo E.Lopez |  |     |      |              | San José del Guaviare |
|   |               |  |     |      |              | Consec                |

**GENERAL EVALUATION**

**11 COMPLIANCE WITH AIR SAFETY**

|      |                                     | PILOTS     |       |         |
|------|-------------------------------------|------------|-------|---------|
| 11,1 | Pilot rules                         | Name       | Name  | Name    |
|      |                                     | Carrothers | Stamm | Thigpen |
|      | Has licence?                        | Y          | Y     | Y       |
|      | Crew knows spraying process manual? | Y          | Y     | Y       |

|  |                                     | PILOTS     |       |         |
|--|-------------------------------------|------------|-------|---------|
|  |                                     | Name       | Name  | Name    |
|  |                                     | Van Ginkel | Henao | Newsome |
|  | Has licence?                        | Y          | Y     | Y       |
|  | Crew knows spraying process manual? | Y          | Y     | Y       |

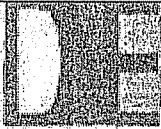
|  |                                     | PILOTS |           |        |
|--|-------------------------------------|--------|-----------|--------|
|  |                                     | Name   | Name      | Name   |
|  |                                     | Dornan | Gutierrez | McGaha |
|  | Has licence?                        | Y      | Y         | Y      |
|  | Crew knows spraying process manual? | Y      | Y         | Y      |

|  |                                     | PILOTS     |      |          |
|--|-------------------------------------|------------|------|----------|
|  |                                     | Name       | Name | Name     |
|  |                                     | Cherpilloz | King | B Amador |
|  | Has licence?                        | Y          | Y    | Y        |
|  | Crew knows spraying process manual? | Y          | Y    | Y        |

|  |                                     | PILOTS |      |      |
|--|-------------------------------------|--------|------|------|
|  |                                     | Name   | Name | Name |
|  |                                     | Stamm  |      |      |
|  | Has licence?                        | Y      | Y    | Y    |
|  | Crew knows spraying process manual? | Y      | Y    | Y    |

**11,2 Operating safety rules**

| Variables  | Response |
|--|----------|
| Type of environmental contingency arising and recorded during missions | 0        |

|  |      |  |          |
|--|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN          | Page 8/8 |
|  | RF1  | Spraying operations management program | Sheet 1  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |
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| Env. Audit   | Jairo E. López |          |     |      |              |      | Consec                |

**GENERAL EVALUATION**

|   |      |
|---|------|
| Status of DelNorte system in aircraft used in spraying                                | Good |
| Pilots know flight techniques and products required for safe operation?               | Y    |
| Crew know the effects of products sprayed on biota and care to be used in application | Y    |

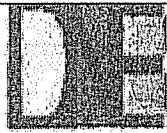
**3 General Information**

No of paramedics taking part in operations 2  
 Is technical support available to base? YES

**4 Type of recommendations received when mission completed by:**

| Type   | Document remittal code |
|--|------------------------|
| Environmental Audit                          |                        |
| Ministry of Housing and Regional Development |                        |
| National Narcotics Directorate               |                        |
| ICA  |                        |
| Other  |                        |

**5 OTHER DEVELOPMENTS TO REPORT**

|   |                |   |     |      |              |                       |
|---|----------------|---|-----|------|--------------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 |     |      |              | Page 1/14             |
|   | RF2            | Industrial Safety program at operations bases |     |      |              | Sheet 2               |
| COMPLETION  |                | REVISION                                      | No. | DATE | APPROVAL     |                       |
| Professional  | Name           |   |     |      | Professional | Name                  |
| Env. Audit  | Jairo E. Pérez |   |     |      |              | San José del Guaviare |
|   |                |   |     |      | Consec       |                       |

Period of Evaluation 01/11/03 to 30/11/03

## 1 BASE DATA

|                             |   |
|-----------------------------|---|
| Name                        | <u>San José del Guaviare Antinarcotics base</u> |
| Address                     | <u>Adjoining San José del Guaviare airport</u>  |
| Municipality                | <u>San José de Guaviare</u>                     |
| Department                  | <u>Guaviare</u>                                 |
| Responsible for environment | <u>Capt Miguel Tunjano</u>                      |
| Type                        | <u>Fixed</u>                                    |

## 2 TRANSPORT

### 2,1 General transport of materials, personnel and equipment maintenance

|  |                 |
|--|-----------------|
| Frequency of maintenance of vehicles for:  |                 |
| 1. Personnel transport   | <u>ND</u>       |
| 2. Materials, chemicals etc transport  | <u>See note</u> |
| Percentage(in relation to all vehicles in general) with gas emission certificates at the base. | <u>ND</u>       |

NOTE: The vehicles for the transport of personnel and chemicals is outsourced.

### 2,2 Transport of Glyphosate

|  |   |
|--|---|
| Haulier takes haulage policy?  | <u>Y</u>  |
| Vehicles carrying glyphosate have health licences?                     | <u>Y</u>  |
| Vehicles carrying glyphosate have cabin separate from the cargo area?  | <u>Y</u>  |
| Vehicles have highway safety equipment?                                | <u>Y</u>  |
| Company gives instructions in handling glyphosate?                     | <u>Y</u>  |
| Waybills are completed upon delivery of the product?                   | <u>Y</u>  |
| Are there personnel at the base responsible for receiving the product? | <u>Y (Responsible officer of Base and stores operators)</u> |
| Control book kept to receipt of product?                               | <u>Y</u>  |

ND Information not available since transport it outsourced with private operators.

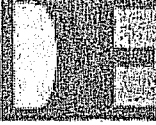
## 3 UNLOADING

|  |  |
|--|--|
| Is technical equipment used to unload glyphosate | <u>Y</u>                                   |
| Are traditional methods used for unloading       | <u>N</u>                                   |
| Operators have industrial safety equipment       | <u>Y(gloves, forklifts, stretch-belts)</u> |

## 4 FUEL STORAGE

Describe area (Two places to store fuels of similar characteristics)



|  |      |   |           |
|--|------|---|-----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 2/14 |
|  | RF2  | Industrial Safety Program at Operations Bases | Sheet 2   |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
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#### FUEL STORAGE

| VARIABLES                                | MATERIAL DESCRIPTION   | STATUS       |
|--|--|--------------|
| Roof                                     | Concrete   | Good         |
| Floor                                    | Concrete   | Good         |
| Walls                                    | Concrete   | Good         |
| Spill collection channels                | Holding pool   | Good         |
| Security (locks, keys etc)               | One site has fencing   | Good         |
| Grease and oil separator                 | NO   | Good         |
| Perimeter ditch and holding capacity     | 40-5m2 and 50m2  |              |
| Signposting (type, qty), demarcation     | Painted signs on tanks (4) and walls (1)   | Good<br>Good |
| Rainwater runoff channels                | NO. Tanks are protected by concrete walls on three sides or by the roof. There is a holding pool                       |              |
| Equipment/materials to deal with spills  | Pumps, ancillary tanks, spill control kit  | Good         |
| Comprehensive safety equipment           | Holding pools with bypass valves, eyewash equipment, emergency showers, cathode protection and anti-explosion circuits | Good         |
| Firefighting equipment                   | Extinguishers  | Good         |
| Spill materials                          | Earth, spill control kit   | Good         |
| Equipment maintenance (leaks and losses) | No leaks   | Good         |

Frequency of maintenance

Daily

#### VEHICLES AND MACHINERY

Frequency of maintenance for machinery used (pumps, hoses, etc)

Description of vehicle parking area

| VARIABLES                        | DESCRIPTION  |
|----------------------------------|--|
| Floor/surface                    | Asphalt  |
| Signposting                      | None   |
| Safety and security              | Area isolated from personnel                         |
| Comprehensive security equipment | Extinguishers  |
| Grease trap                      | No   |
| Comments                         | Parking is along one side of the administration area |

#### AIRCRAFT

Aircraft type (spraying)

Calibration of spraying equipment

Frequency of calibration on the ground

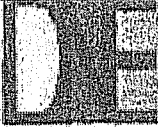
Frequency of maintenance of the ground (aircraft)

OV10

Electronic

Per pilot reports and equipment manuals

Mandatory every 50 or 100 hours functioning, or when damaged or faulty.

|   |                |   |           |
|---|----------------|---|-----------|
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|   | RF2            | Industrial Safety Program at Operations Bases | Sheet 2   |
| COMPLETION  |                | REVISION No.                                  | DATE      |
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| APPROVAL  |                | BASE  |           |
| Professional  | Name           | San José del Guaviare                         |           |
|   |                | Consec  |           |

**Frequency of calibration of spraying equipment**

**Daily (electronic) en operations activities and crew changes**

7 OPERATOR TRAINING

No. of courses given during the period

0

Place where operators took course

No. of operators taking part

No of operator/hours given

Subjects of the courses

No. of technical manuals on base spraying area

1

No. of manuals on herbicide at the base

1

8 OTHER AREAS

Is the administration separate from the operators?

Y

Are there changing rooms for operators?

Y

Location of changing rooms

Cupboards on one side of the door into the agrochemicals stores

Close to site for preparation of the mixture and restrooms

Y

No of first aid packs in:

Combat nurses, paramedics and helicopters have first-aid packs

1. Chemicals stores area

1

2. Equipment stores area

2

3. Places for mixing, washing equipment and loading aircraft

1

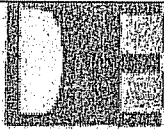
Is the area for equipment and tools storage separate from the chemicals and materials stores?

Y

If not, describe the place (floor, roof, ventilation, security, signposting, demarcation, location etc.)

8,1 Characteristics of the washing area for machinery and equipment (related to handling of the mixture)

|  |   |
|--|---|
| Floor                                    | Concrete slab   |
| Drainage                                 | Perimeter channels  |
| Signposting                              | Informative and warning signs in the area   |
| Destination of wastewater                | Water drains off in perimeter channels into open country (filtration into the soil) |
| Is there a channel for rainwater runoff? | Y (Perimeter channels on the platform)  |

|  |      |  |           |
|--|------|--|-----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 4/14 |
|  | RF2  | Industrial Safety Program for Operations Bases | Sheet 2   |

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### STORAGE OF GLYPHOSATE, COADJUVANTS AND EQUIPMENT

#### Environmental conditions for chemicals storage

|                                 |                                  |
|---------------------------------|----------------------------------|
| Average temperature (deg. C)    | 24 -27                           |
| Avge relative humidity          | > 80%                            |
| Wind (direction, avge strength) | 1.4m/s summer 12-14m/s NE and SE |
| Others                          |                                  |
| Sunlight                        | Avge daily 5 hours               |
| Rainfall mm                     | >2500                            |


#### FIXED BASES

#### Characteristics of the agrochemicals storage site

|  |   |
|--|---|
| Floor  | Concrete  |
| Roof   | Zinc covered metal structure  |
| Walls  | Breeze-block half wall and chainlink  |
| Ventilation                                  | Good, natural ventilation on all sides  |
| Type   | None (chainlink)  |
| No, windows                                  |   |
| Security of site (padlocks, keys) (describe) | Full chainlink fencing round stores, metal and chainlink gate, padlocked  |
| Signposting and demarcation (describe)       | At the entrance it says: Chemicals in the area. No Smoking. No food in this area. Store it right. Firefighting cabinet. Store it right. |
| Shelving                                     | Two structures  |
| • Materials                                  | One brick, one metal  |
| • Number                                     | 2   |
| • Type                                       | Cement slab shelves and metal cupboard  |
| Internal divisions                           | None  |
| Firefighting equipment                       | Extinguishers 10m apart   |
| Spill handling materials                     | 15kg of sawdust, spill control kit and sand   |
| Spill control system                         | Stores act as a spill holding pool. Bypass valve at one side.   |
| Personal protection equipment                | Gloves, overalls for handling chemicals, masks, goggles   |
| Rainwater runoff channels                    |   |

#### CHARACTERISTICS OF MIXTURE PREPARATION SITE

|                                  |  |
|----------------------------------|--|
| Location inside base             | At one side of the platform  |
| Floors                           | Concrete (isolated from earth by impermeable membrane)                 |
| Drainage                         | Mixture spills are held in the pool                                    |
| Signposting                      | Signposting on equipment, storage tanks and walls adjacent to the area |
| Storage tank for possible spills |  |
| Capacity                         | Units of 55 gals, tanks of 500 and 1000 gals                           |
| Material                         | Plastic  |

|   |      |   |           |
|---|------|---|-----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 5/14 |
|   | RF2  | Industrial Safety Program at Operations Bases | Sheet 2   |

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Materials for handling spills

Water, earth, spill control kit (contains pads, barriers and plastic bags)

Spill handling system

Blocking of perimeter ditches with earth bags. Also, herbicide storage tanks are held in a holding pool.

Is there a channel to collect rainwater runoff?

Y

COMMENTS

#### 11 PREPARATION OF THE MIXTURE

##### 11,1 Equipment used (Description, condition, functioning) See leaks and losses

The herbicide mixture is made in a closed-circuit pumping unit that contains a pump, a tank with markings to measure volumes, a series of bypass valves and hoses to allow the mixture to recirculate so that the proper combination is achieved (Glyphosate + coadjuvant + water). To load the plane, there are hoses with sealing valves at the ends to prevent spills of the mixture. All components and equipment are placed on a trailer.

##### 11,2 Describe the deposit used for the prepared mixture: capacity, safety, signposting, spill control system, type of insulation, rainwater collection system etc,

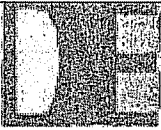
The herbicide is stored in 500/1000 gal plastic tanks. If a tank ruptures, the mixture is held in a ditch made with earth bags covered in impermeable material.  
Signposting is placed on filling and storage equipment (industrial safety notices for a information and prevention).  
Surplus mixture from missions is kept in 55-gallon drums or in the mixing tanks.  
The place is insulated from pedestrian traffic

##### 11,3 Describe personal protection equipment used by the mixer

Personnel have cloth overalls, rubber gloves, plastic helmet, plastic goggles, respirators and ear-muffs

##### 11,4 Composition of the prepared mix

| Type of crop              | COCA-LEAF |       | OPIUM-POPPY |      |
|---------------------------|-----------|-------|-------------|------|
|                           | %         | l/ha  | %           | l/ha |
| Commercial glyphosate     | 43.97     | 10.4  |             |      |
| Coadjuvant Cosmoflux 411F | 1.0       | 0.23  |             |      |
| Water                     | 55.03     | 13.02 |             |      |



|                               |  |           |
|-------------------------------|--|-----------|
| <b>MPMA</b><br><br><b>RF2</b> | <b>ENVIRONMENTAL MANAGEMENT PLAN</b>                 | Page 6/14 |
|                               | <b>Industrial Safety Program for Operations Base</b> | Sheet 2   |

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2 **LOADING THE MIXTURE ONTO AIRCRAFT**

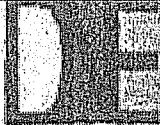
|  | DESCRIPTION  |
|--|--|
| Filling or transfer system   | The product passes from the mixer down a 2.5" hose with a valve at the end, connected to another valve on board. Sealing is hermetic, and the liquid flow is managed through a lever on the valve. The mixture is fed into the aircraft by a pump. |
| Filling site   | Operations base platform   |
| Environmental safety system in the event of accidents (leaks, losses etc.) | Shut off equipment and stop filling. Close bypass valves. Materials available to contain spills.   |
| Materials for handling spills  | Water, earth, spill control kit (pads, barriers, rags, plastic bags, manual)   |
| Firefighting equipment   | ABC type extinguishers   |
| Signposting and demarcation  | Yellow lines painted to show aircraft parking spots. Filling equipment is mobile (trailers) and easily recognizable – no demarcation needed  |

3 **CALIBRATION OF AIRCRAFT EQUIPMENT**

|   |                                       |
|---|---------------------------------------|
| General information                       |                                       |
| Person responsible for calibration        | <u>Dyncorp</u>                        |
| Frequency of calibration                  | <u>Daily if electronic</u>            |
| Frequency of cleaning of aircraft nozzles | <u>Daily during activity periods.</u> |

,2 **Checklist for calibration**

| Activities (describe process in the event of occurrence)   | Verification | Comments |
|--|--------------|----------|
|  |              |          |
| <b>Comments</b>  |              |          |
| The checklist is used only when the system has been failing. The pilot performs electronic calibration, programming the Delnorte software in the cabin. Each mission is evaluated on the basis of information recorded on the electronic card and the report generated and recommendations are made for adjustments or calibration of the spraying equipment.. |              |          |

|   |                |   |     |           |              |      |                       |
|---|----------------|---|-----|-----------|--------------|------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 |     | Page 7/14 |              |      |                       |
|   | RF2            | Industrial Safety Program for Operations Base |     | Sheet 2   |              |      |                       |
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### 13,3 Another method of calibration

Description of the design

Electronic method.

The aircraft has electronic equipment in the cabin into which the pilot introduces data (pass width, volume discharged) to program toe spraying system-. The Delnorte hardware and software is connected to en electronic valve located in the spraying system which regulates the volume of output of the mixture as programmed in the software, aircraft speed and the pressure generated by a mechanical pump (moved by wind action). When the aircraft is in maintenance or the spraying system needs adjustment, tests are eventually performed in the air simulating application conditions in order to adjust the equipment. Tests are run with water. Operating conditions are recorded on the electronic card.

### 13,4 Data of the calibration process and participating personnel

Pressure on strut \_\_\_\_\_

Spraying time on calibration \_\_\_\_\_

Gallons sprayed \_\_\_\_\_

Process time \_\_\_\_\_

No. of operators taking part \_\_\_\_\_

Comments

|  |
|--|
|  |
|--|

### 14 MEASURE TO CONTROL RISKS

14,1 Frequency of supervisions in the glyphosate/ coadjuvant storage site

Daily when the base is operating

14,2 Frequency of supervision of the fuel and lubricants storage site

Daily

14,3 Conditions of the working area

Are accommodation and eating areas separate

Y

Description of accommodation

Accommodation is over 50m from the working area. Buildings designed for military personnel accommodation with power, air conditioning/ ventilation water and sports areas

Description of the eating facility

Generous and separated dining area and kitchen with power, gas and water. Good ventilation.

Is it far from water sources

Y

Does the glyphosate store have zones demarcated?

Y

Are there visible notices warning of the degree of toxicity and flammability of products stored?

Y

Are there DANGER notices and emergency exits?

Y

Does the glyphosate storage area have enough space for personnel to move around and receptacles to be transported

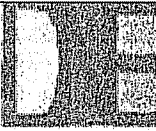
Y

Does it have a roof?

Y

Good ventilation?

Y

|  |               |  |                       |
|--|---------------|--|-----------------------|
|  | MPMA          | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 8/14             |
|  | RF2           | Industrial Safety Program for Operations Bases | Sheet 2               |
| COMPLETION   |               | REVISION                                       | No.                   |
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|  |               |  | Consec                |
|  |               |  | BASE                  |
|  |               |  | San José del Guaviare |

Are there the following materials to control glyphosate spills?

|            |       |    |
|------------|-------|----|
| Sawdust    | _____ | Kg |
| Earth      | ND    | Kg |
| Lime       | _____ | Kg |
| Detergents | _____ | Kg |
| Water      | 5000  | Lt |

Other: Spill control kit is provided in a 350l plastic drum (contains rags, absorbent pads, barriers, plastic bags and gloves, procedure manual)

4 Storage conditions

Tans or containers used to store glyphosate and other chemicals

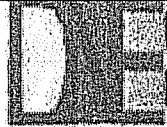
| MATERIAL                 | Qty | Cap         | Condition |
|--------------------------|-----|-------------|-----------|
| Stainless steel          |     |             |           |
| Plastic                  | 2   | 500/1000gal | Good      |
| Unlined galvanized steel |     |             |           |
| Other                    |     |             |           |
| Plastic drums            | 30  | 55gal       | Good      |

5 MEANS OF HANDLING AND FIRST AID

|   |   |
|---|---|
| 1 No., of persona handling glyphosate   | 3 |
| 2 Do persons handling glyphosate apply the following precautions/warnings?    |   |
| Prevent contact with eyes   | Y |
| Prevent contact with clothing   | Y |
| Avoid breathing vapour or spray mist  | Y |
| Wash hands before eating, drinking, chewing gum, smoking or using the toilet  | Y |
| Change clothing contaminated with herbicide and wash thoroughly with soap     | Y |
| Avoid contamination of water by eliminating wastewater from washing equipment | Y |

3 Number of intoxications with glyphosate presented by

|  |   |
|--|---|
| Inhalation                                 | 0 |
| Contact with eyes                          | 0 |
| Contact through skin                       | 0 |
| Ingestion                                  | 0 |
| 4 No. of times medical attention requested | 0 |

|   |      |   |           |
|---|------|---|-----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 9/14 |
|   | RF2  | Industrial Safety Program for Operations Base | Sheet 2   |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec                |

**MEASURE TO COMBAT SPILLS**

|      |  |   |  |
|------|--|---|--|
| 16   |  |   |  |
| 16,1 | No. of persons manipulating glyphosate at the base | 3 |  |
| 16,2 | No of persons with complete safety equipment       | 3 |  |
|      | Missing items                                      |   |  |
|      | Helmet   |   |  |
|      | Gloves   |   |  |
|      | Respirator   |   |  |
|      | FACE mask  |   |  |
|      | Goggles  |   |  |
|      | Overalls   |   |  |
|      | Rubber trousers and boots                          |   |  |
|      | Other: Helmet                                      |   |  |
|      | Gloves   |   |  |

16,3 Number of nearby water sources contaminated during the period. 0

16,4 Number of herbicide spills occurring during the period. ND  
 Description of actions taken to correct contamination

- 1)
- 2)
- 3)

Describe final disposal of the material used as the absorbent

**17 FIREFIGHTING MEASURES**

|      |   |                               |
|------|---|-------------------------------|
| 17,1 | Regularity of cleaning and tidying the premises                     | Daily                         |
| 17,2 | Number of checks on electrical installations                        | Records to be implemented are |
| 17,3 | Does for fire alarm system work?                                    | Y                             |
| 17,4 | No of extinguishers at the Base (state whether A, B, C or D or N/K) |                               |

| Location             | Qty | Type    |
|----------------------|-----|---------|
| Herbicide store      |     |         |
| Filling area (pumps) | 2   | ABC+PQS |
| Herbicide pump       |     |         |
| Cafeteria            | 1   | ABC     |
| Kitchen              |     |         |
| Fuel stores          | 2   | ABC     |



| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env- audit.  | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

|                       |   |     |
|-----------------------|---|-----|
| Hangars               | 2 | ABC |
| Office                |   |     |
| Aircraft parking area | 6 | ABC |
| Other                 |   |     |
|                       |   |     |

|   |               |
|---|---------------|
| 5 Latest inspection                                 | Jan 2003      |
| 6 Expires   | Jan 2004      |
| 7 Last recharged                                    | Jan 2003      |
| 8 Date of latest training for personnel on handling | December 2002 |

MEASURES FOR GUERRILLA ARRACK INVOLVING  
GLYPHOSATE

|  |                                    |
|--|------------------------------------|
| 1 Hard wall height around glyphosate storage area                                    | 1.50mr                             |
| Glyphosate storage area wall material(concrete, breezeblock, metal etc)              | Breezeblock ands chainlink fencing |
| 2 Condition of waste evacuation system   | Good                               |
| 3 No of available receptacles with lids to collect up liquids in the event of combat | 50 (2x1000gal)                     |

WASHING OF AIRCRAFT AND MAINTENANCE OF MIXING EQUIPMENT

|   |   |
|---|---|
| 1 Washing after spraying operations                       |   |
| Is the washing place far from water sources?              | Y |
| No. of washing places                                     | 1 |
| Is there a special system for discharging this wastewater | N |
| Latest maintenance for discharge system                   | - |
| Is the absence of herbicide checked prior to washing?     | Y |

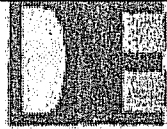
NOTE. Glyphosate hoppers are only emptied for repairs or overhauls  
Maintenance of mixing equipment

|   |                      |
|---|----------------------|
| 2 Frequency of maintenance to avoid leaks of pure and mixed substances. |                      |
| Doser   | As marked            |
| Mixing tank   | Per losses/leaks     |
| Joints  | Per per Losses/leaks |
| Hoses   | Per Losses/leaks     |
| Nozzles   | Per losses/leaks     |

Other

GENERAL MEASURES

|  |           |
|--|-----------|
| 1 Frequency of relief of personnel                               | 8-15 days |
| 2 Are unauthorized personnel allowed to stay in the storage area | NO        |

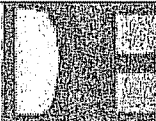
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|---|----------------|--|-----|------|--------------|------------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                  |     |      |              | Page 11/14 |                       |
|   | RF2            | Industrial Safety Program for Operations Bases |     |      |              | Sheet 1    |                       |
| COMPLETION  |                | REVISION                                       | No. | DATE | APPROVAL     |            | BASE                  |
| Professional  | Name           |  |     |      | Professional | Name       | San José del Guaviare |
| Env. Audit  | Jairo E. Pérez |  |     |      |              |            | Consec                |

|       |   |  |
|-------|---|--|
| 20,3  | Are unauthorized personnel allowed access to aircraft, maintenance shops or parking areas?  | N  |
|       | Are all electrical installations explosion-proof?   | N.   |
| 20,4  | Is smoking allowed in working areas?  | N  |
| 20,5  | No of cases of drug/hallucinogens consumption at the workplace  | 0  |
| 20,6  | No of civilians carrying weapons in work areas  | 0  |
| 20,7  | No of cases reported of trading with Program goods  | 0  |
| 20,8  | Date of latest Comprehensive Security training for employees  | 12/ 2002   |
| -     | Person responsible for induction for each new employee  | Capt Miguel Tunjano  |
| 20,9  | No of persons responsible for monitoring safety compliance  | 2  |
| 20,10 | Are workers given Procedure Manuals for their Jobs in welding, electricity, excavation, load lifting, materials storage and work at altitude Name Manuals | PECIG activity procedure are delivered<br><br>Information on Glyphosate and Cosmoflux materials at DIRAN bases!, Comprehensive Security on Operations Platforms”, “Information on Herbicides- Materials Handling”” |
|       | Note: Non-PECIG activities are contracted out, and contractors are responsible for their own personnel.   |  |
| 20,11 | Is there signposting and demarcation for each working area and access route? Areas and routes lacking signposting and demarcation                         | Y  |

|  |
|--|
|  |
|--|

20,12 Reports attached of technical checks on vehicles, aircraft, equipment, materials, installations, procedures and systems:  
 1) Reports of technical checks on vehicles, aircraft, equipment, materials, installations, procedures and systems and kept by Dyncorp and DIRAN:

Due to the large number of equipment, aircraft and materials held at the Base, it is not appropriate to present this documentation. Reference documents are available at the DIRAN and Dyncorp technical departments.

|  |      |  |            |
|--|------|--|------------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 12/14 |
|  | RF2  | Industrial Safety Program for Operations Bases | Sheet 2    |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env.Audit    | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

13 Is there an operations investigation program to minimize operations base accidents? **Y**  
 NOTE: ARAVI Aviation Area) is responsible for industrial safety matters and air safety. Dyncorp also has these two areas.

14 Is there constant compliance with Decree 1843/1993 for the use and handling of pesticide? **Y**  
 In what respect has there been non-compliance?  
 Since the Base is transitory, matters such as herbicide storage and equipment washing have not been able to be observed fully.

15 Are there forms to control established measures (attach the latest of each) **Control notebooks**

16 Control and prevention programs for personnel engaged in mixing and filling.

| Program name                | Date started  | Duration |
|-----------------------------|---------------|----------|
| Occupational Health Program | December 2002 | 60 hours |
|                             |               |          |

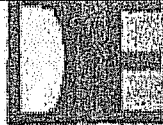
17 Description of methods to check understanding of and compliance with base COs  
 Measures and rules transmitted as orders, manuals or talks, and are mandatory  
 Contracted personnel are contacted by memorandum, and technical manuals for each function are delivered.

18 Regular medical examinations for personnel engaged in mixing and other platform activities

| Name of examination | No of personnel examined |
|---------------------|--------------------------|
|                     |                          |
|                     |                          |

19 Base supervision of spraying-related activities (attach report)

| Name of Operations base visited | Date | Report? (Y/N) |
|---------------------------------|------|---------------|
|                                 |      |               |
|                                 |      |               |

|   |                |  |            |      |              |      |                       |
|---|----------------|--|------------|------|--------------|------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 13/14 |      |              |      |                       |
|   | RF2            | Industrial Safety Program for Operations Bases | Sheet 2    |      |              |      |                       |
| COMPLETION  |                | REVISION                                       | No.        | DATE | APPROVAL     | BASE |                       |
| Professional  | Name           |  |            |      | Professional | Name | San José del Guaviare |
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21 COMMANDER OF THE SPRAYING BASE

21,1 Description of procedures used to teach personnel to dose mixtures, in respect of rules and regulations

ARECI issues orders, rules and regulations for Operations Base personnel to perform their particular functions.

21,2 Description of procedure employed to disseminate rules, regulations and manuals for the use and handling of chemicals

Each operator has a folder containing his functions, rules and procedures. Talks and refresher courses are given regularly.

21,3 Is there care to comply with technical and environmental conditions suggested by Environmental Audit. Y

21,4 How often is there supervision of mixing of the herbicide and calibration of equipment? Daily

21,5 Description of procedure to coordinate the sending of spraying polygrams to DIRAN, with reports of new developments.

DIRAN has a polygram form to be completed by the Secretary of the Operations Base. It is signed by the COI of the Operations Base or the ARECI Coordinator and faxed to the DIRAN-Bogotá radio office. Originals are then regularly sent to ARECI Bogotá, for filing

22 HERBICIDE MIXING TECHNICIAN

22,1 No of workers mixing at the Base 3

22,2 % of mixers not using protective equipment 0%


22,3 Reports on deficiencies in workings or maintenance or leaks

| Deficiency | Equipment | Date |
|------------|-----------|------|
|            |           |      |
|            |           |      |

22,4 Are accounts kept of mixing operations? Y

22,5 Date of re-conditioning of storage area, signposting, demarcation of zones. \_\_\_\_\_

COMMENTS

|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 1/5 |
|  | RF3  | Solid Waste management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     | BASE                  |
|--------------|----------------|----------|-----|------|--------------|-----------------------|
| Professional | Name           |          |     |      | Professional | Name                  |
| Env. audit.  | Jairo E. Perez |          |     |      |              | San José del Guaviare |
|              |                |          |     |      |              | Consec                |

Period of evaluation : 1/11/2003 – 30/11/2003

Note: Enter "ND" if no information is available

**1 DATA OF OPERATIONS BASE**

1,1 Name of base San Jose del Guaviare Antinarcotics airbase  
 1,2 Person responsible for environmental management Capt Miguel Tunjano

**2 CHARACTERISTICS OF THE BASE**

2,1 Normal headcount 50  
 2,2 Days' operations in this period 14  
 2,3 Hours of spraying operation in this period 86.8 (flying hours)

**3 CONSUMPTION OF MATERIALS, FUEL, ENERGY**

|                               |                                  |         |  |  |
|-------------------------------|----------------------------------|---------|--|--|
| Description                   | Roundup                          | 4626.3  |  |  |
| 3,1 Glyphosate (50 gal drums) |                                  |         |  |  |
| Coadjuvants                   | Cosmoflux F411                   | 106.08  |  |  |
| Water in mix                  |                                  | 5837.93 |  |  |
| Grease, oil, lubricants       | Oil for aircraft and helicopters | ND      |  |  |
| Paint and accelerants         |                                  |         |  |  |
| Solvents                      |                                  |         |  |  |
| Other                         |                                  |         |  |  |

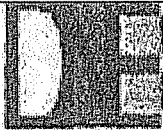
3,2 Fuel ND  
 Gasolina ND  
 Gas ND  
 Other:  
 3,3 Electricity ND Kw/h

**4 DATA OF SPRAYING OPERATION**

4,1 No of spraying flights in this period 88  
 4,2 Area sprayed 1697.33 ha

**5 ORIGIN AND PRODUCTION OF WASTE**

|         | DESCRIPTION    |     |      |
|---------|----------------|-----|------|
| 5,1 DSW | Organic matter | Kg  | 2400 |
|         | Paper          | Kig | ND   |
|         | Cardboard      | Kg  | ND   |

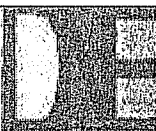
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|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN  |     |      | Page 2/5     |        |                       |
|   | RF3            | Solid Waste Management Program |     |      | Sheet 3      |        |                       |
| COMPLETION  |                | REVISION                       | No. | DATE | APPROVAL     | BASE   |                       |
| Professional  | Name           |                                |     |      | Professional | Name   | San José del Guaviare |
| Env. audit.   | Jairo E. Pérez |                                |     |      |              | Consec |                       |

|     |     |                                     |            |              |
|-----|-----|-------------------------------------|------------|--------------|
| 5,2 |     | Glass                               | Kg         |              |
|     |     | Plastic                             | Kg         |              |
|     |     | Rubber                              | Kg         |              |
|     |     | Wood                                | Kg         |              |
|     |     | Estimate of the above               |            | 8400         |
|     |     | <b>TOTAL AVERAGE FOR THE PERIOD</b> |            | <b>10800</b> |
| 5,3 | SSW | Construction rubble                 | Kg         | 0            |
|     |     | Packaging                           | Kg         | 0            |
|     |     | Mixtures                            | Kg         | 0            |
|     |     | Grease and oil                      | Kg         | ND           |
|     |     | Metal shavings                      | Kg         | 0            |
|     |     | <b>TOTAL AVERAGE FOR THE PERIOD</b> |            | <b>ND</b>    |
| 5,3 | RSA | 55 gallon drums                     | drums      | 85           |
|     |     | 5 gallon plastic receptacles        | Receptacle | 22           |
|     |     | <b>TOTAL AVERAGE FOR THE PERIOD</b> |            | <b>107</b>   |

Note: Quantities of DSW and SSW are estimated since no records of quantities are kept at the Base

## 6 GENERAL DATE OF SOLID WASTE MANAGEMENT

|      | Description  |       |                       |
|------|--|-------|-----------------------|
| 6,1  | Offices, camps, restaurants, maintenance workshops separating and storing domestic and special waste separately                                | 2     |                       |
| 6,2  | Provisional domestic and special waste receptacles with lids   | 5     |                       |
| 6,3  | Monthly burning of waste   | 1     |                       |
| 6,4  | No of times refuse collected   | Daily |                       |
| 6,5  | No of times refuse collected in public places, worksites, ditches etc.   | Daily |                       |
| 6,6  | Sites for disposal of all or part of waste in environmentally sensitive places   | 0     |                       |
| 6,7  | Places for waste disposal protected from wind action, distant from water sources or currents and away from human settlements.                  | 1     |                       |
| 6,8  | Places for waste disposal with means of control such as external channels  | 0     |                       |
| 6,9  | Marked receptacles containing special or hazardous waste indicating characteristics of the product and the danger run if receptacle is opened. | 0     |                       |
| 6,10 | Program for separation at source of materials such as paper, metal and glass (recyclable) from other waste during (months).                    | 9     | Start date 01/02/2003 |

|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 3/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

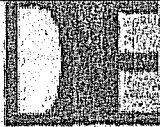
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

|      |   |                   |                                  |
|------|---|-------------------|----------------------------------|
| 6,11 | No of receptacles available to make separation at source.   | 16 (oil and fuel) | Receptacles                      |
| 6,12 | Are personnel environmentally aware and do they participate in the program for separation at source?.     | 60                | % of personnel                   |
| 6,13 | No of storage places available for temporary storage of waste   | 3                 | Distribution: Hangars and stores |
| 6,14 | Area occupied by storable special solid waste (herbicide drums and receptacles in the stores)             | 40                | M2                               |
| 6,15 | No of 55-gallon drums on each compartment for special waste for temporary disposal of classified waste    | 16 (oil and fuel) | Drums/bins                       |
| 6,16 | No of times a month that non-recoverable waste is taken directly to the infill or approved disposal site. | 4                 | Times/month                      |

7 DOMESTIC SOLID WASTE (DSW) MANAGEMENT PLAN

Data for this period only

|     | Description  | Qty      | Comments   |
|-----|--|----------|--|
| 7,1 | Receptacles for collection and separation in situ of existing waste in each Base working area                                      | 30       |  |
| 7,2 | Training for personnel working at the Base, security personnel, visitors, regarding work in separation of waste at source.         | 0        | Training is given by ARECI personnel in rotation round operations bases.         |
| 7,3 | No of times a month that organic waste (waste food) is taken to the infill of the nearest municipality.                            | 30 a day | Organic solid waste (food) is collected by a contractor and used for animal feed |
| 7,4 | No of days that inorganic waste remains in temporary disposal sites prior to removal to the tip                                    | 1-2      |  |
| 7,5 | No of times that supervision plans and mechanisms are used to control hygiene and avoid the production of smells and other vectors | Daily    |  |
| 7,6 | No of times a month that recyclable solid waste is delivered to municipal recycling cooperatives                                   | 0        | Program to be implemented  |
| 7,7 | % compliance with disposal and final treatment of DSW  | 60       |  |

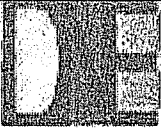
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|---|----------------|--------------------------------|-----|------|--------------|--------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN  |     |      | Page 4/5     |        |                       |
|   | RF3            | Solid Waste Management Program |     |      | Sheet 3      |        |                       |
| COMPLETION  |                | REVISION                       | No. | DATE | APPROVAL     | BASE   |                       |
| Professional  | Name           |                                |     |      | Professional | Name   | San José del Guaviare |
| Env Audit   | Jairo E. Pérez |                                |     |      |              | Consec |                       |

## 8 MANAGEMENT PLAN FOR SPECIAL SOLID WASTE (SSW)

Data for this period only

|      | Description   |                 |   |
|------|---|-----------------|---|
| 8,1  | Oil changes in vehicles, aircraft and machinery off base  | 0               |   |
| 8,2  | 55-gallon drums storing burnt oil from machinery, vehicles, plant or workshops  | 6               | Kit has 4 55-gallon drums                                       |
| 8,3  | Metal or plastic drums not in good condition and being used for storage of SSW  | 0               |   |
| 8,4  | No of times that classification and separation of SSW at origin has failed  | ND              | Records to be implemented                                       |
| 8,5  | Receptacles for special waste (red)   | 2               | 5-gallon metal bins with absorbent material                     |
| 8,6  | Receptacles for oily waste (black)  | 6 oil & 10 fuel |   |
| 8,7  | Kg of SSW disposed on in a security infill or incinerated   | 0               |   |
| 8,8  | No of sales of containers or other materials that have been in contact with chemicals or hydrocarbons after decontamination as directed by the manufacturer | 0               |   |
| 8,9  | No of used batteries stored on the Base   | 0               | Disposable batteries are in spares for aircraft and helicopters |
| 8,10 | Kg of metal waste selected, separated and sold for recycling  | 0               |   |
| 8,11 | Kg of Wood selected, separated and sold for recycling   | 0               |   |
| 8,12 | Kg of hazardous substances used and transformed at the time of disposal in toxic elements   | 0               |   |
| 8,13 | No of accidental spills of special chemicals  | ND              |   |
| 8,14 | Program activities that reuse metal, plastic and rubber waste.  | 0               | None  |
| 8,15 | Names of specialized companies authorized to eliminate waste oil and grease   | 0               | Dyncorp is responsible  |
| 8,16 | Names of used substances or products that contain asbestos, chlorates, lithium batteries, PCBs and mercury  | 0               |   |



|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 5/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

|      |  |   |                                 |
|------|--|---|---------------------------------|
| 8,17 | Names of contractors responsible for control, handling and conditioning of areas affected by accidental spills of special chemicals. |   | Activities of DIRAN and DYNCORP |
| 8,18 | Last time returned to supplier of hazardous substances   |   | DD/MM/YY                        |
| 8,19 | Names of hazardous substances used and transformed at the time of disposal in toxic elements.  | 0 |                                 |

Note: Herbicide containers are used to build barricades and defences of the Operations Base.

#### 9 MANAGEMENT PLAN FOR SOLID WASTE LINKED TO THE HANDLING OF GLYPHOSATE (reg)

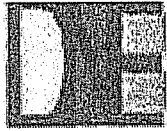
|     | Description  | Qty | Comments                    |
|-----|--|-----|-----------------------------|
| 9,1 | No of containers of glyphosate, surfactants and other products added into the formulation used as receptacles for waste after washing with water | 35  |                             |
| 9,2 | M2 occupied by REG in the compartment of the stores used for temporary disposal of recyclable waste  | 50  |                             |
| 9,3 | Litres of water used in washing receptacles at the base for reuse in aircraft tanks  | 0   | Mechanism to be implemented |
| 9,4 | No of containers sold or given away to local inhabitants   | 0   | DD/MM/YY                    |
| 9,5 | Last time the glyphosate distributor (Monsanto) collected and removed containers to special deposits.  | ND  |                             |

#### 10 FOLLOW-UP AND MONITORING

|      |   |  |   |
|------|---|--|---|
| 10,1 | Name and post of person effecting daily inspections of the temporary waste storage area (Attach reports or copies of notebooks) |  | The mixer is responsible for inspections. Patrolman T López |
| 10,2 | Name and post of person making inspections of Base installations to verify compliance with activities (attach reports)          |  | Base CO   |
| 10,3 | Name and post of the person making weekly follow-up of the recovery and recycling program.                                      |  | Patrolman T López   |

#### COMMENTS

|  |
|--|
|  |
|--|

|   |                |   |     |      |              |                                 |
|---|----------------|---|-----|------|--------------|---------------------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 |     |      | Page 1/6     |                                 |
|   | RF4            | Wastewater Management Program for PECIG Bases |     |      | Sheet 4      |                                 |
| COMPLETION  |                | REVISION                                      | No. | DATE | APPROVAL     | BASE                            |
| Professional  | Name           |   |     |      | Professional | Name                            |
| Env Audit   | Jairo E. Pérez |   |     |      |              | San José del Guaviare<br>Consec |

Evaluation: 01/11/03 to 30/11/03

## 1 DATA OF OPERATIONS BASE

- 1,1 Name San José de Guaviare Antinarcotics Base  
 1,2 Person responsible for environmental matters Capt Miguel Tunjano

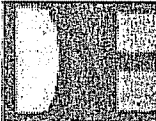
### 2 USE AND MANAGEMENT OF WATER

- 2,1 Supply  
 The licence or permit to use water is valid until ND  
 Used for processes and services 1.57cu.m./day  
(processes)

|     |  |       |   |
|-----|--|-------|---|
| 2,2 | Water source   |       |   |
|     | Public supply  |       |   |
|     | Well   | 22.09 |   |
|     | Spring   |       |   |
|     | Other (what)   |       |   |
| 2,3 | Water consumption  |       |   |
|     | Public supply  |       |   |
|     | Well   | 22.09 |   |
|     | Spring   |       |   |
|     | Other (what)   |       |   |
| 2,4 | Type of treatment given to water (at Base or in the municipal utility) |       | There is a small treatment plant that filters and disinfects (sand-filter tank and activated carbon filter) |
| 2,5 | Water is recycled from   |       |   |
|     | Industrial use   | 0     |   |
|     | Tank washing   | 0     |   |
|     | Other  |       |   |

### 3 ORIGIN AND PRODUCTION OF WASTEWATER

| Description  | YES/NO                                   |
|--|--|
| 3,1 Is domestic wastewater generated by Base personnel during operation times?                                     | Y  |
| 3,2 Is there water from washing installations that passes into the rainwater network?                              | N  |
| 3,3 Is there rainwater that goes into the collection system independently of sewage and evacuated out of the Base? | No (rainwater is filtered into the soil) |
| 3,4 Is there water from aircraft tank washing contaminated with glyphosate?  | Y  |
| 3,5 General services currently available   |  |
| Generation of electricity  | Y  |
| Workshops-Garages  | Y  |
|  |  |

|  |      |   |          |
|--|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 2/6 |
|  | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

|              |                |          |     |      |              |      |                       |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

4 CAUSES OF GENERATION OF DISCHARGES

|     |  |    |
|-----|--|----|
| 4,1 | Generation of secondary products   | 0  |
|     | Quantity of mixture badly prepared due to wrong measurements                       | 0  |
|     | Quantity of mixture badly prepared due to contamination of equipment with catalyts | 0  |
|     | Quantity of mixture badly prepared due to equipment malfunction                    | ND |
|     | Quantity of mixture spilled in emergencies   | 0  |

4,2 Use of toxic materials

| Type           | Lts | Name |
|----------------|-----|------|
| Solvents       | ND  |      |
| Heavy metals   | 0   |      |
| Anticorrosives | ND  |      |
| Antifoam       | 0   |      |

4,3 Accidental loss or deterioration of materials/products

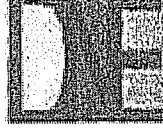
| Type                                      | Equipment  |
|---|--|
| Leaks into the soil                       | Might take place eventually at the herbicide mixing site |
| Evaporation of volatile organic compounds | N/A  |
| Other                                     |  |

4,4 Points and flows of discharge

| Location                                    | Flow (cu.m./hour) | Origin           | Received by     |
|---|-------------------|------------------|-----------------|
| Antinarcotics Coy (Housing, administration) | ND                | Toilets, kitchen | Treatment plant |
| Hangar restroom                             | ND                | Toilet           | Septic tank     |
| Hangar area                                 | ND                | Rainwater        | Soil            |

4,5 Composition of drainage system at Base and contamination

| Description  | Y/N | Comments   |
|--|-----|--|
| Water free of oil and grease                                     |     |  |
| Rainwater with no oil, offices, stores                           | Y   |  |
| Accidentally contaminated water                                  |     |  |
| Rain or firefighting water not normally contaminated             | N   |  |
| Continually contaminated water                                   |     |  |
| Tank drainage, rain in mixing area, filling, etc                 | Y   | To be evaluated (rainwater captured on the platform might be contaminated) |
| Process water in contact with raw materials, storage, byproducts | N   |  |

|   |                |  |     |          |              |      |                       |
|---|----------------|--|-----|----------|--------------|------|-----------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                |     | Page 3/6 |              |      |                       |
|   | RF4            | Wastewater Management Program at PECIG Bases |     | Sheet 4  |              |      |                       |
| COMPLETION  |                | REVISION                                     | No. | DATE     | APPROVAL     | BASE |                       |
| Professional  | Name           |  |     |          | Professional | Name | San José del Guaviare |
| Env Audit   | Jairo E. Pérez |  |     |          |              |      | Consec                |

|   |   |  |
|---|---|--|
| Water for hygiene uses similar to domestic use in clearing offices, cafeterias, etc | Y |  |
|---|---|--|

#### 4,6 Segregation of effluent

| Type  | Y/N | Comments                              |
|---|-----|---------------------------------------|
| Sewage  | Y   | Treatment plant                       |
| Rainwater                                     | N   |                                       |
| Water with oil/grease                         | N   | Only generated in kitchen and toilets |
| Mixture production process water              | N   |                                       |
| Aircraft tank washing water                   | N   |                                       |
| Water contaminated with glyphosate or mixture | N   |                                       |

#### 4,7 Characteristics of the rainwater system

| Description  | Y/N | Condition  | Comment                         |
|--|-----|--|---------------------------------|
| Contaminants are carried to soil or non-contaminated channels  | Y   | To be established                                |                                 |
| The system collects rainwater from platform areas, gardens and sports facilities                             | N   |  | Rainwater filters into the soil |
| The system collects rainwater from internal roads, roofs, administration, hangars, trailers and parking area | N   | Some of the water from the platform is collected |                                 |

### 5 REATMENT OF WASTEWATER

#### 5,1 Treatment of wastewater at the Base

Name wells, springs or other water sources contaminated by the wastewater treatment system

No contamination of springs or water sources is generated

The gradient for the evacuation of effluent is

%

The wastewater treatment system is located at a distance from the Base of

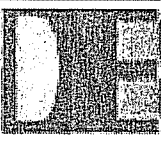
Inside the Base at 200m from point of origin

The wastewater treatment system is close to the well NO spring NO or other source at a distance of

metres

#### 5,2 Class of effluent treated

| Effluent                                      | Cu.m/day | Comments  |
|---|----------|---|
| Sewage  | ND       | From buildings (accommodation). The new treatment plant can process 3.5cu.m./hour |
| Rainwater                                     | -        |   |
| Water with oil/grease                         | 0        | From kitchens   |
| Mixture production process water              | 0        |   |
| Aircraft tank washing water                   | 0        |   |
| Water contaminated with glyphosate or mixture | 0        |   |



MPMA

ENVIRONMENTAL MANAGEMENT PLAN

Page 4/6

RF4

Wastewater Management Program for PECIG Bases

Sheet 4

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

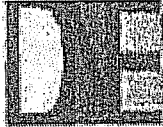
5,3 Base Purifying Plant (if any)  
 Plant type Physical-biological (Biological filtering and purification) (Oxygenation process)  
 Types of effluent treated Domestic sewage  
 Available surface for plant 30-40 cu.m.  
 Treatment Capacity 3.5 cu.m./hour  
 Yield in Purification To be established

5,4 Special Liquid Waste (SLW) This refers to liquids contaminated with glyphosate or prepared mixture. The treatment given is:  
 Discharge into the public sewerage system N  
 Biological system N  
 Deep burial N  
 Chemical deactivation N  
 Note: surplus herbicide mix is recycled

5,5 Domestic Liquid Waste (DLW)  
 Discharged direct into the public system N  
 Is treatment applied to DLW? S  
 Treatment is .... Permanent  
 Effluent parameters are -  
 Maximum capacity of treatment system 6.5cu.m./day  
 Loads and main characteristics of the treatment system  
 DBO load \_\_\_\_\_ Kg/day  
 SS load \_\_\_\_\_ Kg/day  
 Average retention time \_\_\_\_\_ Hours  
 Maximum air flow \_\_\_\_\_ Cu.ft air/cu.m. day  
 Recirculation \_\_\_\_\_ %  
 DBO removal \_\_\_\_\_ %  
 SST removal \_\_\_\_\_ %  
 Maintenance as specified by builder  
 Latest maintenance date ND DDMMYY  
 Time of biological destabilization of the process and proliferation of unpleasant smells ND DDMMYY

6 STUDY OF DISCHARGES

6,1 Wastewater is discharged from the whole Base to:  
 Watercourse N  
 Public sewerage network N  
 Septic tanks Y  
 Open ground N  
 6,2 Expiry of discharge permit N  
 6,3 Latest verification of discharge quality Under implementation

|   |      |   |          |
|---|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN<br>Wastewater management Program for PECIG<br>Bases | Page 5/6 |
|   | RF4  |   |          |

|              |                |          |     |      |              |      |                       |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

6,5 Physical-Chemical and microbiological analysis on each discharge

Attach laboratory results  
List of analysis results attached

| Discharge | Source | Date analyzed | Laboratory analyzing |
|-----------|--------|---------------|----------------------|
| 1         |        |               |                      |
| 2         |        |               |                      |

7 SLUDGE TREATMENT  
Complete only if there is treatment of wastewater

8 THE ENVIRONMENTAL SITUATION

8,1 Discharges into watercourses?

N, No discharges are made externally. Water is recycled and used in industrial processes (mixing, washing of equipment, offices etc.)

Expiry date of discharge 'permit  
Name of receiving watercourse  
Basin  
Flow (cu.m./hour)  
Average  
Uses of water outside the Base

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Minimum

|                             |          |                               |
|-----------------------------|----------|-------------------------------|
| Upstream                    |          |                               |
| Downstream                  |          |                               |
| Classification of discharge |          |                               |
| Description                 | Election | Comments                      |
| Contaminating               |          |                               |
| Non-contaminating           |          |                               |
| Potentially contaminating   |          |                               |
| Not evaluated               |          | To be clarified and evaluated |

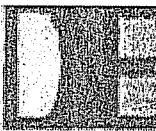
8,2 Discharge into public sewerage network  
Date of expiry of discharge permit  
Capacity of Municipal purifier  
Type of treatment given  
Characteristics of municipal sewerage system

DDMMYY  
\_\_\_\_\_ Cu.m./hour

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8,3 Discharge to septic tank  
Date of expiry of discharge 'permit  
Capacity of tanks installed to serve the Plant  
Age  
Condition (good, acceptable, bad)

\_\_\_\_\_ DDMMYY  
\_\_\_\_\_ Cu.ft  
\_\_\_\_\_ Months  
\_\_\_\_\_

|  |      |   |          |
|--|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 6/6 |
|  | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec                |  |

Sludge cleaning period \_\_\_\_\_ (Annual, half yearly, quarterly, monthly, other)  
 Latest overflow date \_\_\_\_\_ DDMMYY

8,4 Other discharges existing in the area Households in San Jose del Guaviare, airport, farms  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

9 FOLLOWUP AND MONITORING  
 9,1 Date of latest quarterly characterization of Basic sanitation parameters to text the effectiveness of the treatment system and compliance with regulations on discharges (attach the last two laboratory results)

October/03 DDMMAA

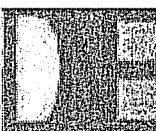
COMMENTS

MOBILE ANTINARCOTICS BASE  
TAME – ARAUCA

EMP FORMS

PECIG ENVIRONMENTAL AUDIT



|  |             |  |          |
|--|-------------|--|----------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN          | Page 1/8 |
|  | RF1-MOA     | Spraying Operations Management Program |          |

|              |                |          |     |      |              |      |               |  |
|--------------|----------------|----------|-----|------|--------------|------|---------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec        |  |

**GENERAL EVALUATION**  
(Complete this form for each operations base)

**Period of evaluation (monthly)**

From 01/11/03 To 30/11/03

|   |            |            |            |            |
|---|------------|------------|------------|------------|
| Coordinates of area<br>Sprayed in this evaluation | N          | S          | E          | W          |
|   | 06°52'07'' | 06°33'09'' | 06°50'55'' | 06°44'31'' |
|   | 71°19'15'' | 71°26'56'' | 71°15'39'' | 71°11'49'' |

Area sprayed 3,052.36 ha  
Municipalities sprayed from this base Araucita, Tame, Puerto Rondón

Departments Arauca

**2 DATA OF OPERATIONS BASE**

- 2,1 Base name Antinarcotics airbase Tame - mobile
- 2,2 TAME airport – Engineers Battalion 18 Navas Pardo
- \* Municipality Tame e
- \* Department Arauca
- 2,3 Base CO Lt Col Carlos Augusto Aljure-Escandon. Maj-. Nestor Bastidas- Rincón, Maj Gustavo Chavarro
- 2,4 Responsible for Environmental Mgmt Capt Miguel Antonio Tunjano

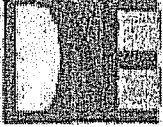
**3 EMPLOYMENT INFORMATION**

- 3,1 Days operation in the period 13
- 3,2 Days poor conditions preventing spraying 4
- 3,3 Days of aircraft maintenance 1
- 3,4 Other types of day 8 troop transfers, 4 for reconnaissance

**4 GENERAL INFORMATION ON MISSIONS**

- 4,1 No of missions in period 59
- 4,2 No. of spraying records raised in period 13
- 4,3 No. of invitations sent to civilian authorities 0
- 4,4 Frequency of attendance of civilian authorities and control bodies to PECIG in period

| Officer's name | Entity | Post | Participation in missions |
|----------------|--------|------|---------------------------|
|                |        |      |                           |
|                |        |      |                           |

|   |               |  |     |          |              |      |               |
|---|---------------|--|-----|----------|--------------|------|---------------|
|  | MPMA-112001   | ENVIRONMENTAL MANAGEMENT PLAN          |     | Page 2/8 |              |      |               |
|   | RF1-MOA       | Spraying Operations Management Program |     | Sheet 1  |              |      |               |
| COMPLETION  |               | REVISION                               | No. | DATE     | APPROVAL     | BASE |               |
| Professional  | Name          |  |     |          | Professional | Name | Tame - mobile |
| Env Audit   | Jairo E Perez |  |     |          |              |      | Consec        |

### GENERAL EVALUATION

#### 5 NO. OF FLIGHTS

|     |   |    |
|-----|---|----|
| 5,1 | No of detection fights in period                    | 8  |
| 5,2 | No. of spraying flights                             | 59 |
| 5,3 | No. of flights to determine crops prior to spraying | 30 |

\*The process includes satellite detection, air detection, geo-referencing of projects and verification of images, photos and other kinds of information

#### 5,4 No. of flights cancelled due to:

Atmospheric conditions \_\_\_\_\_  
 Technical reasons \_\_\_\_\_  
 Harassment \_\_\_\_\_   
 Pilot's decision \_\_\_\_\_  
 Other (what?) \_\_\_\_\_

#### 6 DETECTION OF ILLICIT CROPS

##### 6,1 TYPES OF IMAGE USED TO DETECT NUCLEUS EVALUATED BY SATELLITE

| Type | Path-Row | Date | Resolution | Region/Nucleus | No. of missions |
|------|----------|------|------------|----------------|-----------------|
|      |          |      |            |                |                 |
|      |          |      |            |                |                 |

AERIAL PHOTOGRAPHY

| Type | Flight No. | Photo no. | Date | Scale | No of missions |
|------|------------|-----------|------|-------|----------------|
|      |            |           |      |       |                |

CARTOGRAPHY

| Type | No. | Date | Scale | Region/nucleus | No. of missions |
|------|-----|------|-------|----------------|-----------------|
|      |     |      |       |                |                 |


OVERFLIGHT

Indicate dates of detection in Nucleus Evaluated

| Date | Participants | Objective | Coordinates | No of missions |
|------|--------------|-----------|-------------|----------------|
|      |              |           |             |                |

##### 6,2 AUDIOVISUAL SUPPORT

| MISSIONS | Photos      |              | Videos |      |
|----------|-------------|--------------|--------|------|
|          | Album title | No of photos | Code   | Date |
|          |             |              |        |      |

|  |                 |                                     |          |
|--|-----------------|-------------------------------------|----------|
|  | MPMA-<br>112001 | ENVIRONMENTAL MANAGEMENT PLAN       | Page 3/8 |
|  | RF1-MOA         | Spraying operations management plan | Sheet 1  |

|              |                |          |     |      |              |      |               |  |
|--------------|----------------|----------|-----|------|--------------|------|---------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |  |
| Env Audit    | Jairo E. Perez |          |     |      |              |      | Consec        |  |

### GENERAL EVALUATION

### 3 ENVIRONMENTAL ZONING OF SPRAYING OPERATIONS

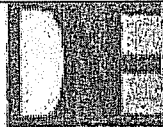
| AREAS ZONED  | Name  | Surface                              |    | Environmental treatment given |
|--|---|--------------------------------------|----|-------------------------------|
|  |   | Ha                                   | %* |                               |
| Ecologically fragile<br>Nature Park  | El Cocuy  | 306,000                              |    | Exclusion                     |
| Culturally fragile<br>Indigenous reservations  | San José de Lipa or Caño Colorado<br>Los Iguanitos<br>Angosturas<br>Cusay-La Colorada<br>Sabanas de Curipao   | 3767<br>754<br>3282<br>1261<br>32932 |    | Exclusion                     |
| Archaeological parks   |   |                                      |    |                               |
| Historic monuments   |   |                                      |    |                               |
| Environmentally sensitive<br>Bodies of water R Rivers<br>Q:Streams H: Wetlands<br>La: Lagoons L: Lakes | R Arauca, R Ele, R. Culloto, R.<br>Cuarteles, R. Cravo Norte, R Caño<br>Iguanito, Caño Caranal, Caño Las<br>Dantas, Caño Totumo, Caño Juju, Q. la<br>Colorada, Caño Negro | ND                                   |    | Exclusion                     |
|  |   | ND                                   |    | Exclusion                     |
|  |   | ND                                   |    | Exclusion                     |
| Native forest  |   |                                      |    |                               |
| Socially sensitive<br>Agglomerated human<br>settlements (towns, villages,<br>hamlets)**                | Araucita (M), Puerto López, San Juan<br>de la Reínera, Brisas del Carnal, San<br>Rafael, Las Abejas, Puerto Rondón,(M),<br>La Esperanza, TAME (M), La Arabia              | ND                                   |    | Exclusion                     |

\*% of total block area

\*\* State whether Cgto: Corregidor District, Cas: Hamlet, Insp Pol: Police District, M: Municipality, O: Other

### ENVIRONMENTAL ZONING (continued)

| AREAS ZONED   | Name         | Surface |   | Environmental treatment |
|---|--------------|---------|---|-------------------------|
|   |              | Ha      | % |                         |
| Economically sensitive:<br>Infrastructure works: roads,<br>airports, river, ports,<br>seaports, dams, power<br>stations | TAME airport | ND      |   | Exclusion               |
| Manual eradication areas<br>Alternative Development<br>Project Areas<br>Irrigation and Drainage<br>areas                |              |         |   |                         |

|   |               |                                     |          |
|---|---------------|-------------------------------------|----------|
|  | MPMA-112001   | ENVIRONMENTAL MANAGEMENT PLAN       | Page 4/8 |
|   | RF1-MOA       | Spraying operations management plan | Sheet 1  |
| COMPLETION  |               | REVISION                            | No.      |
| Professional  | Name          |                                     | DATE     |
| Env Audit   | Jairo-E.Perez |                                     |          |
| APPROVAL  |               | BASE                                |          |
| Professional  | Name          | Tame - mobile                       |          |
|   |               | Consec                              |          |

### EVALUATION OF A SPRAYING BLOCK

|                                    |  |    |  |              |
|------------------------------------|--|----|--|--------------|
| Industrial zones                   |  |    |  |              |
| Opencast mining operations         |  |    |  |              |
| Rural commercial tourism complexes |  |    |  |              |
| Rural institutional complexes      |  |    |  |              |
| Environmental exclusion areas      |  | ND |  | Partial area |
| Total zoning areas                 |  | ND |  |              |

ND: No information available

#### 6.4 ANALYSIS OF SPRAYING RECORDS (attached)

Glyphosate spraying area records are as follows:

#### 6.5 GENERAL INFORMATION ON SPRAYING

|  |   |    |
|--|---|----|
| Are there spraying manuals at the operations base?   | YES   |    |
| Are there support escort for spray aircraft manuals at base  | YES   |    |
| Frequency of aircraft spraying equipment   | Mandatory every 50 and 100 hrs or if damage appears in the system |    |
| Frequency of general washing of spraying equipment   | Every 8 days, when required by blockage of nozzles                |    |
| Frequency of calibration of spraying equipment   | Daily   |    |
| Are planning and evaluation meetings held  | YES   |    |
| No of training classes during the period for operators (stores, tanks) participating in operations | 0   |    |
| No of polygrams recorded during period   | 30  |    |
| No of records of spraying operations during period   | 13  |    |
| No of DelNorte recordings  | Valid   | 58 |
|  | Failed/malfunction  | 1  |
| Does pilot know processes, rules, restrictions on spraying processes?                              | Yes   |    |
| Does pilot know environmental effects of PECIG substances applied?                                 | Yes   |    |
| Does pilot know effects on human and animal health of PECIG substances applied ?                   | Yes   |    |

RECORD OF ILLICIT COCA-LEAF CROPS  
MOBILE BASE, TAME, ARAUCA, PERIOD NOVEMBER 1-30,

| No. | MISSION  | AREA<br>GASTADA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>REPORTE (gal) | DEPARTAMENTO | MUNICIPIO                   | OBSERVACIONES         |
|-----|----------|--------------------------------------|--|--------------|-----------------------------|-----------------------|
| 1   | K023ADAC | 48.76                                | 132  | ARAUCA       | Araucula                    |                       |
| 2   | K053ADAC | 55.85                                | 158  | ARAUCA       | Araucula                    |                       |
| 3   | K173ALAC | 45.83                                | 132  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 4   | K173ALBC | 56.00                                | 154  | ARAUCA       | Araucula                    | Sin archivo magnetico |
| 5   | K173IAC  | 51.75                                | 143  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 6   | K173I#BC | 59.58                                | 154  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 7   | K173EFAC | 32.50                                | 131  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 8   | K173EFBC | 59.58                                | 152  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 9   | K183ALAC | 59.67                                | 141  | ARAUCA       | Puerto Rondón -<br>Araucula |                       |
| 10  | K183CFAC | 56.00                                | 154  | ARAUCA       | Araucula                    | Sin archivo magnetico |
| 11  | K183EFAC | 0.00                                 | 0.0  | ARAUCA       | Araucula                    | Misión cancelada      |
| 12  | K193ALAC | 57.71                                | 153  | ARAUCA       | Puerto Rondón               |                       |
| 13  | K193ALBC | 55.79                                | 154  | ARAUCA       | Puerto Rondón               |                       |
| 14  | K193ALCC | 56.21                                | 154  | ARAUCA       | Puerto Rondón               |                       |
| 15  | K193CFAC | 56.00                                | 154  | ARAUCA       | Puerto Rondón               | Sin archivo magnetico |
| 16  | K193CFBC | 60.80                                | 154  | ARAUCA       | Puerto Rondón               |                       |
| 17  | K193CFCC | 58.89                                | 154  | ARAUCA       | Puerto Rondón               |                       |
| 18  | K193EFAC | 45.38                                | 121  | ARAUCA       | Puerto Rondón               |                       |
| 19  | K193EFBC | 59.78                                | 152  | ARAUCA       | Puerto Rondón               |                       |
| 20  | K193EFCC | 54.77                                | 152  | ARAUCA       | Puerto Rondón               |                       |

REGISTROS DE ASPERSION AREA CON GLIFOSATO  
CULTIVOS ILLICITOS DE COCA  
BASE MOVIL DE TAME - ARAUCA  
PERIODO 1 - 30 DE NOVIEMBRE DE 2003

2003

Key  
Misión  
Area asperjada  
Herbicide gastado según reporte (gal)  
Departamento  
Municipio  
Observaciones  
Sin archivo magnético:  
Misión cancelada

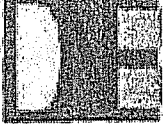
Misión  
Area sprayed  
Herbicide used (per report) (gal)  
Department  
Municipality  
Comments  
No magnetic file  
Mission cancelled

| No. | MISION  | AREA<br>ASPERADA<br>(ha) | HERBICIDA<br>GASTADA<br>SEGUN<br>REPORTE (q) | DEPARTAMENTO | MUNICIPIO       | OBSERVACIONES         |
|-----|---------|--------------------------|--|--------------|-----------------|-----------------------|
| 21  | K2031AC | 57.03                    | 154  | ARAUCA       | Araquita        |                       |
| 22  | K203#AC | 61.80                    | 154  | ARAUCA       | Araquita        |                       |
| 23  | K203#AC | 55.82                    | 154  | ARAUCA       | Araquita        |                       |
| 24  | K213#AC | 40.53                    | 110  | ARAUCA       | Araquita        |                       |
| 25  | K213#AC | 39.00                    | 110  | ARAUCA       | Araquita        |                       |
| 26  | K223#AC | 39.49                    | 110  | ARAUCA       | Tame - Araquita |                       |
| 27  | K223#AC | 55.13                    | 144  | ARAUCA       | Tame - Araquita |                       |
| 28  | K223#AC | 46.07                    | 131  | ARAUCA       | Tame - Araquita |                       |
| 29  | K231#AC | 57.26                    | 154  | ARAUCA       | Araquita        |                       |
| 30  | K231#AC | 58.12                    | 154  | ARAUCA       | Araquita        |                       |
| 31  | K231#AC | 56.25                    | 154  | ARAUCA       | Araquita        |                       |
| 32  | K231#AC | 59.56                    | 159  | ARAUCA       | Araquita        |                       |
| 33  | K233#AC | 55.59                    | 154  | ARAUCA       | Araquita        |                       |
| 34  | K233#AC | 62.89                    | 154  | ARAUCA       | Araquita        |                       |
| 35  | K233#AC | 54.81                    | 154  | ARAUCA       | Araquita        |                       |
| 36  | K233#AC | 57.95                    | 154  | ARAUCA       | Araquita        |                       |
| 37  | K233#AC | 56.78                    | 150  | ARAUCA       | Araquita        |                       |
| 38  | K233#AC | 55.77                    | 154  | ARAUCA       | Araquita        |                       |
| 39  | K233#AC | 53.68                    | 150  | ARAUCA       | Araquita        |                       |
| 40  | K233#AC | 55.58                    | 154  | ARAUCA       | Araquita        |                       |
| 41  | K233#AC | 57.46                    | 154  | ARAUCA       | Araquita        |                       |
| 42  | K233#AC | 66.47                    | 154  | ARAUCA       | Araquita        |                       |
| 43  | K233#AC | 57.52                    | 154  | ARAUCA       | Araquita        |                       |
| 44  | K233#AC | 51.31                    | 150  | ARAUCA       | Araquita        |                       |
| 45  | K233#AC | 54.04                    | 150  | ARAUCA       | Araquita        |                       |
| 46  | K233#AC | 55.80                    | 152  | ARAUCA       | Araquita        |                       |
| 47  | K233#AC | 56.80                    | 154  | ARAUCA       | Araquita        | Sin archivo magnetico |
| 48  | K233#AC | 56.00                    | 154  | ARAUCA       | Araquita        | Sin archivo magnetico |
| 49  | K233#AC | 50.86                    | 154  | ARAUCA       | Araquita        |                       |
| 50  | K233#AC | 57.25                    | 154  | ARAUCA       | Araquita        |                       |
| 51  | K233#AC | 58.04                    | 154  | ARAUCA       | Araquita        |                       |
| 52  | K233#AC | 61.05                    | 154  | ARAUCA       | Araquita        |                       |

Key: see previous page

| No. | MISION   | AREA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>DEPARTAMENTO | DEPARTAMENTO | MUNICIPIO | OBSERVACIONES    |
|-----|----------|---------------------------|---|--------------|-----------|------------------|
| 53  | K273CDAC | 58,81                     | 154   | ARAUCA       | Araucuita |                  |
| 54  | K273CDBC | 54,66                     | 154   | ARAUCA       | Araucuita |                  |
| 55  | K273CDCC | 37,02                     | 88  | ARAUCA       | Araucuita |                  |
| 56  | K273EBAC | 47,97                     | 154   | ARAUCA       | Araucuita |                  |
| 57  | K273EBBC | 56,17                     | 154   | ARAUCA       | Araucuita |                  |
| 58  | K293ABAC | 25,76                     | 70  | ARAUCA       | Araucuita |                  |
| 59  | K293AZAC | 0,00                      | 0,0   | ARAUCA       |           | Mision cancelada |
| 59  |          | 3052,36                   | 8319,96                                       |              |           |                  |

Source: Dyncorp reports  
Key: see previous page

|   |                |  |     |      |              |               |
|---|----------------|--|-----|------|--------------|---------------|
|  | MPMA-112001    | ENVIRONMENTAL MANAGEMENT PLAN          |     |      |              | Page 5/8      |
|   | RF1-MOA        | Spraying operations management program |     |      |              |               |
| COMPLETION  |                | REVISION                               | No. | DATE | APPROVAL     | BASE          |
| Professional  | Name           |  |     |      | Professional | Name          |
| Env. Audit  | Jairo E. Perez |  |     |      |              | Tame - mobile |
|   |                |  |     |      |              | Consec        |

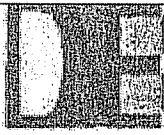
### GENERAL EVALUATION

#### 7 CLIMATIC DATA FOR SPRAYING IN THE PERIOD (November 2003)

| Days | Operation type | TEMPERATURE °C | Rel. Humidity | WINDS | Hours application | Comments                    |
|------|----------------|----------------|---------------|-------|-------------------|-----------------------------|
| 1    | No operation   |                |               |       |                   | Troop transfer              |
| 2    | Spraying       | ND             | ND            | ND    | 13.00-14.00       |                             |
| 3    | No operation   |                |               |       |                   | Troop transfer              |
| 4    | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 5    | Spraying       | ND             | ND            | ND    | 10.05-11.35       |                             |
| 6    | No operation   |                |               |       |                   |                             |
| 7    | No operation   |                |               |       |                   | Air reconnaissance          |
| 8    | No operation   |                |               |       |                   | Air reconnaissance          |
| 9    | No operation   |                |               |       |                   | Air reconnaissance          |
| 10   | No operation   |                |               |       |                   | Air reconnaissance          |
| 11   | No operation   |                |               |       |                   | Troop transfer              |
| 12   | No operation   |                |               |       |                   | Troop transfer              |
| 13   | No operation   |                |               |       |                   | Troop transfer              |
| 14   | No operation   |                |               |       |                   | Troop transfer              |
| 15   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 16   | No operation   |                |               |       |                   | Preventive maintenance      |
| 17   | Spraying       | ND             | ND            | ND    | 8-20-12.25        |                             |
| 18   | Spraying       | ND             | ND            | ND    | 14.15-15.45       |                             |
| 19   | Spraying       | ND             | ND            | ND    | 7.35-14.55        |                             |
| 20   | Spraying       | ND             | ND            | ND    | 14.15-15.45       |                             |
| 21   | Spraying       | ND             | ND            | ND    | 7.30-9.00         |                             |
| 22   | Spraying       | ND             | ND            | ND    | 12.10-13.55       |                             |
| 23   | Spraying       | ND             | ND            | ND    | 7.00-14.50        |                             |
| 24   | Spraying       | ND             |               |       | 7.35-13.20        |                             |
| 25   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 26   | Spraying       | ND             | ND            | ND    | 6.55-10.45        |                             |
| 27   | Spraying       | ND             | ND            | ND    | 6.25-9-156        |                             |
| 28   | No operation   |                |               |       | 9.15-10-05        | Troop transfer              |
| 29   | Spraying       | ND             | ND            | ND    |                   |                             |
| 30   | No operation   |                |               |       |                   | Troop transfer              |

ND: No information available from DIRAN




|  |             |  |          |
|--|-------------|--|----------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN          | Page 6/8 |
|  | RF1-MOA     | Spraying operations management program | Sheet 1  |

|              |               |          |     |      |              |      |               |  |
|--------------|---------------|----------|-----|------|--------------|------|---------------|--|
| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
| Professional | Name          |          |     |      | Professional | Name | Tame - mobile |  |
| Env. Audit   | Jairo E.Perez |          |     |      |              |      | Consec        |  |

**CONSOLIDATED SPRAYING AREAS DURING THE PERIOD (November 2003)**

| Department | Municipalities | Inspection / Corregidor district | Area (ha) of coca | Aircraft PNC No., | Comments |
|------------|----------------|----------------------------------|-------------------|-------------------|----------|
|------------|----------------|----------------------------------|-------------------|-------------------|----------|

**COMMENTS**

|   |               |  |     |      |              |               |
|---|---------------|--|-----|------|--------------|---------------|
|  | MPMA-112001   | ENVIRONMENTAL MANAGEMENT PLAN          |     |      |              | Page 7/8      |
|   | RF1-MOA       | Spraying operations management program |     |      |              | Sheet 1       |
| COMPLETION  |               | REVISION                               | No. | DATE | APPROVAL     |               |
| Professional  | Name          |  |     |      | Professional | Name          |
| Env. Audit  | Jairo E.Perez |  |     |      |              | Consec        |
|   |               |  |     |      |              | BASE          |
|   |               |  |     |      |              | Tame - mobile |

**10 CROP SPRAYING**

10,1 Type of crop sprayed-COCA-LEAF

10,2 Type of aircraft used OV10

10,3 Operating parameters (Average for the period)

| Parameter                       | Unit         | Value/range | Verification |
|---------------------------------|--------------|-------------|--------------|
| FLIGHT ALTITUDE                 | M            | <50         | 188.06 asl   |
| Dosage                          | l/ha         | 10.4        | 10.4         |
| Windspeed                       | Knots        | <5          | ND           |
| Airspeed                        | MPH          | -           |              |
| Drift                           | Knots (OV10) | <5          | <5           |
| Compliance with exclusion zones |              |             | Y            |
|                                 |              |             |              |

**11 COMPLIANCE WITH AIR SAFETY**

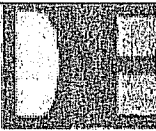
11,1

| Pilot rules                         | PILOTS  |         |          |
|-------------------------------------|---------|---------|----------|
|                                     | Name    | Name    | Name     |
|                                     | Perez C | Falla R | Pineda F |
| Has licence?                        | Y       | Y       | Y        |
| Crew knows spraying process manual? | Y       | Y       | Y        |

| Pilot rules                         | PILOTS   |             |          |
|-------------------------------------|----------|-------------|----------|
|                                     | Name     | Name        | Name     |
|                                     | Garcia M | Fernandez R | Solano F |
| Has licence?                        | Y        | Y           | Y        |
| Crew knows spraying process manual? | Y        | Y           | Y        |

| Pilot rules                         | PILOTS   |           |      |
|-------------------------------------|----------|-----------|------|
|                                     | Name     | Name      | Name |
|                                     | Vasconez | Cabrera H |      |
| Has licence?                        | Y        | Y         |      |
| Crew knows spraying process manual? | Y        | Y         | Y    |

Note: ND No information available

|  |             |  |          |
|--|-------------|--|----------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN          | Page 7/8 |
|  | RF1-MOA     | Spraying operations management program | Sheet 1  |

| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
|--------------|---------------|----------|-----|------|--------------|------|---------------|--|
| Professional | Name          |          |     |      | Professional | Name | Tame - mobile |  |
| Env. Audit   | Jairo E.Perez |          |     |      |              |      | Consec        |  |

2. Operating safety rules

| Variables   | Response |
|---|----------|
| Type of environmental contingency arising and recorded during missions                | 0        |
| Status of DelNorte system in aircraft used in spraying                                | Good     |
| Pilots know flight techniques and products required for safe operation?               | Y        |
| Crew know the effects of products sprayed on biota and care to be used in application | Y        |

3. General Information

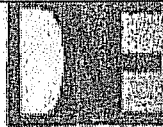
|  |     |
|--|-----|
| No of paramedics taking part in operations | 1   |
| Is technical support available to base?    | YES |

4. Type of recommendations received when mission completed by:

|  | Type | Document remittal code |
|--|------|------------------------|
| Environmental Audit                          |      |                        |
| Ministry of Housing and Regional Development |      |                        |
| National Narcotics Directorate               |      |                        |
| ICA  |      |                        |
| Other  |      |                        |

5. OTHER DEVELOPMENTS TO REPORT

|  |
|--|
|  |
|--|

|   |                |   |                   |
|---|----------------|---|-------------------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 1/14         |
|   | RF2            | Industrial Safety program at operations bases | Sheet 2           |
| COMPLETION  |                | REVISION                                      | No.               |
| Professional  | Name           | DATE  | APPROVAL          |
| Env. Audit  | Jairo E. Pérez |   | Professional Name |
|   |                |   | BASE              |
|   |                |   | Tame-mobile       |
|   |                |   | Consec            |

Period of Evaluation 01/11/03 to 30/11/03

1 BASE DATA

Name San José del Guaviare  
 Antinarcotics base  
 Address Tame airport  
 Municipality Tame  
 Department Arauca  
 Responsible for environment Capt Miguel Tunjano  
 Type Mobile

2 TRANSPORT

2,1 General transport of materials, personnel and equipment maintenance

Frequency of maintenance of vehicles for:

1. Personnel transport ND  
 2. Materials, chemicals etc transport See note

Percentage(in relation to all vehicles in general) with gas emission certificates at the base. ND

NOTE: The vehicles for the transport of personnel and chemicals is outsourced.

2,2 Transport of Glyphosate

Haulier takes haulage policy? Y  
 Vehicles carrying glyphosate have health licences? Y  
 Vehicles carrying glyphosate have cabin separate from the cargo area? Y  
 Vehicles have highway safety equipment? Y  
 Company gives instructions in handling glyphosate? Y  
 Waybills are completed upon delivery of the product? Y  
 Are there personnel at the base responsible for receiving the product? Y  
 (Responsible officer of Base and stores operators)

Control book kept to receipt of product? Y  
 ND Information not available since transport it outsourced with private operators.

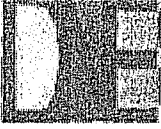
3 UNLOADING

Is technical equipment used to unload glyphosate Y  
 Are traditional methods used for unloading N  
 Operators have industrial safety equipment Y(gloves, bin trolley)

4 FUEL STORAGE

Describe area (Two places to store fuels of similar characteristics)

|      |    |
|------|----|
| Roof | NO |
|------|----|

|  |                |   |           |
|--|----------------|---|-----------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 2/14 |
|  | RF2            | Industrial Safety Program at Operations Bases | Sheet 2   |
| COMPLETION   |                | REVISION                                      | No.       |
| Professional   | Name           |   |           |
| Env. Audit   | Jairo E. López |   |           |
| APPROVAL   |                | BASE  |           |
| Professional   | Name           | San José del Guaviare                         |           |
|  |                | Consec  |           |

#### FUEL STORAGE

| VARIABLES                                | MATERIAL DESCRIPTION                              | STATUS       |
|--|---|--------------|
| Floor                                    | Earth (plastic protection)                        | Good         |
| Walls                                    | No (earth bags)                                   | Good         |
| Spill collection channels                | Holding pool                                      | Good         |
| Security (locks, keys etc)               | One site has fencing                              | Good         |
| Grease and oil separator                 | NO  | Good         |
| Perimeter ditch and holding capacity     | Yes, earth bags covered with impermeable material |              |
| Signposting (type, qty), demarcation     | Demarcation with yellow tape                      | Good<br>Good |
| Rainwater runoff channels                |   |              |
| Equipment/materials to deal with spills  | Pumps, spill control kit                          | Good         |
| Comprehensive safety equipment           | Cathode protection                                | Good         |
| Firefighting equipment                   | Extinguishers and (CAA) firefighting equipment    | Good         |
| Spill materials                          | Spill control kit                                 | Good         |
| Equipment maintenance (leaks and losses) | No leaks  | Good         |

Frequency of maintenance

Daily

#### VEHICLES AND MACHINERY

Frequency of maintenance for machinery based (pumps, hoses, etc)

ND (contra cted)

Description of vehicle parking area

As and when damaged/deteriorated

| VARIABLES                        | DESCRIPTION                                     |
|----------------------------------|---|
| Floor/surface                    | Asphalt   |
| Signposting                      | None  |
| Safety and security              | Area isolated from airport and civilian traffic |
| Comprehensive security equipment | Extinguishers, water tank                       |
| Grease trap                      | No  |
| Comments                         | Parking is along one side of the platform       |

#### AIRCRAFT

Aircraft type (spraying)

T65

Calibration of spraying equipment

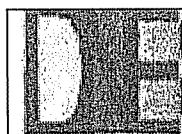
Electronic

Frequency of calibration on the ground

Per pilot reports and equipment manuals

Frequency of maintenance of the ground (aircraft)

Mandatory every 50 or 100 hours functioning, or when damaged or faulty.



MPMA

RF2

ENVIRONMENTAL MANAGEMENT PLAN

Industrial Safety Program at Operations Bases

Page 3/14

Sheet 2

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE                  |
|--------------|----------------|----------|-----|------|--------------|------|-----------------------|
| Professional | Name           |          |     |      | Professional | Name | San José del Guaviare |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec                |

Frequency of calibration of spraying equipment

Daily (electronic) en operations activities and crew changes

7 OPERATOR TRAINING

No. of courses given during the period

0

Place where operators took course

No. of operators taking part

No of operator/hours given

Subjects of the courses

No. of technical manuals on base spraying area

1

No. of manuals on herbicide at the base

1

8 OTHER AREAS

Is the administration separate from the operators?

Y (no own admin area)

Are there changing rooms for operators?

Y

Location of changing rooms

Close to site for preparation of the mixture and restrooms

No of first aid packs in:

Combat nurses, paramedics and helicopters have first-aid packs

1. Chemicals stores area

0

2. Equipment stores area

1

3. Places for mixing, washing equipment and loading aircraft

0

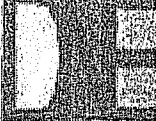
Is the area for equipment and tools storage separate from the chemicals and materials stores?

Y

If not, describe the place (floor, roof, ventilation, security, signposting, demarcation, location etc.)

8,1 Characteristics of the washing area for machinery and equipment (related to handling of the mixture)

|  |                          |
|--|--------------------------|
| Floor                                    | Asphalt                  |
| Drainage                                 | Ground slope             |
| Signposting                              | NO                       |
| Destination of wastewater                | Filtration into the soil |
| Is there a channel for rainwater runoff? | N                        |

|  |      |  |           |
|--|------|--|-----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 4/14 |
|  | RF2  | Industrial Safety Program for Operations Bases | Sheet 2   |

| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE                  |  |
|--------------|---------------|----------|-----|------|--------------|------|-----------------------|--|
| Professional | Name          |          |     |      | Professional | Name | San José del Guaviare |  |
| Env. Audit   | José E. Pérez |          |     |      |              |      | Consec                |  |

### STORAGE OF GLYPHOSATE, COADJUVANTS AND EQUIPMENT

#### Environmental conditions for chemicals storage

|                                 |                      |
|---------------------------------|----------------------|
| Average temperature (deg. C)    | 28                   |
| Avge relative humidity          | > 86%                |
| Wind (direction, avge strength) |                      |
| Others                          |                      |
| Sunlight                        | Avge monthly 260 hrs |
| Rainfall mm                     | 322mm/year           |

#### FIXED BASES

##### Characteristics of the agrochemicals storage site

|  |  |
|--|--|
| Floor  | Earth/wood (planks)  |
| Roof   | Open air   |
| Walls  |  |
| Ventilation Type                             | Good   |
| Security of site (padlocks, keys) (describe) | Uniformed airport personnel and Antinarcotics Police provide security in the aircraft parking areas, mixing equipment and temporary herbicide store. Isolated from civilian personnel and passers-by |
| Firefighting equipment                       | Extinguishers  |
| Spill handling materials                     | Water, spill control kit   |
| Personal protection equipment                | Gloves, overalls, aprons, masks, goggles, earmuffs   |
| Rainwater runoff channels                    |  |

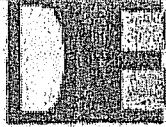
#### CHARACTERISTICS OF MIXTURE PREPARATION SITE

|   |  |
|---|--|
| Location inside base                            | At an ancillary site at Tame airport   |
| Floors  | Asphalt-earth (isolated from earth by impermeable membrane)  |
| Drainage  | Mixture spills are held in the pool  |
| Signposting                                     | Signposting on equipment, storage tanks; area isolated by plastic tapes  |
| Storage tank for possible spills                |  |
| Capacity  | Units of 55 gals, tanks of 500 1000 gals   |
| Material of construction                        | Plastic  |
| Materials for handling spill                    | Water, spill control kit   |
| Spill handling system                           | Blocking with earth bags.( holding pool).  |
| Is there a channel to collect rainwater runoff? | N  |
| COMMENTS  | The quantity of equipment, materials and inputs held by PECIG is small due to restrictions imposed by commercial airport operators |

#### PREPARATION OF THE MIXTURE

Equipment used (Description, condition, functioning) See leaks and losses

Equipment has the same features as those evaluated in Tumaco, San José or Larandia. In perfect working order.

|   |                |   |     |      |               |           |
|---|----------------|---|-----|------|---------------|-----------|
|  | MPMA-112001    | ENVIRONMENTAL MANAGEMENT PLAN                 |     |      |               | Page 5/14 |
|   | RF2            | Industrial Safety Program at Operations Bases |     |      |               | Sheet 2   |
| COMPLETION  |                | REVISION                                      | No. | DATE | APPROVAL      |           |
| Professional  | Name           |   |     |      | Professional  | Name      |
| Env. audit.   | Jairo E. Pérez |   |     |      |               |           |
|   |                |   |     |      | BASE          |           |
|   |                |   |     |      | Tame - mobile |           |
|   |                |   |     |      | Consec        |           |

11,2 Describe the deposit used for the prepared mixture: capacity, safety, signposting, spill control system, type of insulation, rainwater collection system etc,

The herbicide is stored in 500 gal plastic tanks. If a tank ruptures, the mixture is held in a ditch made with earth bags covered in impermeable material.  
 Signposting is placed on filling and storage equipment (industrial safety notices for a information and prevention). Surplus mixture from missions is kept in 55-gallon drums or in the mixing tanks.  
 The place is insulated from pedestrian traffic by security fencing and police and private security services of the airport  
 The platform has no rainwater collection system.

11,3 Describe personal protection equipment used by the mixer

Personnel have cloth overalls, rubber gloves, plastic helmet, plastic goggles, respirators and ear-muffs

11,4 Composition of the prepared mix

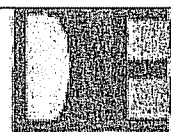
| Type of crop<br>ITEM      | COCA-LEAF |       | OPIUM-POPPY |      |
|---------------------------|-----------|-------|-------------|------|
|                           | %         | l/ha  | %           | l/ha |
| Commercial glyphosate     | 43.97     | 10.4  |             |      |
| Coadjuvant Cosmoflux 411F | 1.0       | 0.23  |             |      |
| Water                     | 55.03     | 13.02 |             |      |

## 12 LOADING THE MIXTURE ONTO AIRCRAFT

|  | DESCRIPTION  |
|--|--|
| Filling or transfer system   | Similar to that described for Larandía or San José. The mixing equipment is the same, as is the type of connector valve.   |
| Filling site   | Tame operations base platform  |
| Environmental safety system in the event of accidents (leaks, losses etc.) | Shut off equipment and stop filling. Close bypass valves. Materials available to contain spills.   |
| Materials for handling spills  | Water, spill control kit (pads, barriers, rags, plastic bags, manual   |
| Firefighting equipment   | Extinguishers. Airport firebrigade equipment   |
| Signposting and demarcation  | Signposting on mixing and herbicide filling equipment, Since this is a mobile base, no permanent signs can be placed and no areas on the platform can be demarcated due to administrative restrictions of the airport. |

No of operators taking part 2  
 Do operators know of safety measures in the event of accidents? Y





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112001

ENVIRONMENTAL MANAGEMENT PLAN

Page 6/14

RF2

Industrial Safety Program for Operations Base

Sheet 2

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
|--------------|----------------|----------|-----|------|--------------|------|---------------|--|
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec        |  |

3 CALIBRATION OF AIRCRAFT EQUIPMENT

,1 General information

Person responsible for calibration

Dyncorp DIRAN

Frequency of calibration

Daily if electronic

Frequency of cleaning of aircraft nozzles

Daily during activity periods.

,2 Checklist for calibration

| Activities (describe process in the event of occurrence)   | Verification | Comments |
|--|--------------|----------|
| Comments   |              |          |
| The checklist is used only when the system has been failing. The pilot performs electronic calibration, programming the Delnorte software in the cabin. Each mission is evaluated on the basis of information recorded on the electronic card and the report generated and recommendations are made for adjustments or calibration of the spraying equipment |              |          |

,3 Another method of calibration

Description of the design

Electronic method.

The aircraft has electronic equipment in the cabin into which the pilot introduces data (pass width, volume discharged) to program the spraying system-. The Delnorte hardware and software is connected to an electronic valve located in the spraying system which regulates the volume of output of the mixture as programmed in the software, aircraft speed and the pressure generated by a mechanical pump (moved by wind action). When the aircraft is in maintenance or the spraying system needs adjustment, tests are eventually performed in the air simulating application conditions in order to adjust the equipment. Tests are run with water. Operating conditions are recorded on the electronic card.

,4 Data of the calibration process and participating personnel

Pressure on strut

Spraying time on calibration

Gallons sprayed

Process time

No. of operators taking part

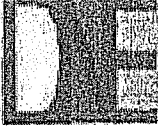
Comments

Due to civil aviation restrictions imposed by the Tame Airport (commercial) authority traditional calibration must be effected at other Bases. When the spraying system has been in maintenance of arts are changed out, the spraying equipment is calibrated using water.

4 MEASURE TO CONTROL RISKS

,1 Frequency of supervisions in the glyphosate/  
coadjuvant storage site

Daily when the base is operating

|   |                |   |     |           |              |      |               |
|---|----------------|---|-----|-----------|--------------|------|---------------|
|  | MPMA-112001    | ENVIRONMENTAL MANAGEMENT PLAN                 |     | Page 7/14 |              |      |               |
|   | RF2            | Industrial Safety Program for Operations Base |     | Sheet 2   |              |      |               |
| COMPLETION  |                | REVISION                                      | No. | DATE      | APPROVAL     | BASE |               |
| Professional  | Name           |   |     |           | Professional | Name | Tame - mobile |
| Env. audit.   | Jairo E. Pérez |   |     |           |              |      | Consec        |

Frequency of supervision of the fuel and lubricants storage site Daily

14,2

14,3

Conditions of the working area

Are accommodation and eating areas separate

Y

Description of accommodation

Local hotels, army barracks

Description of the eating facility

Local restaurants

Is it far from water sources

N

Does the glyphosate store have zones demarcated?

Y. Temporary stores

Are there visible notices warning of the degree of toxicity and flammability of products stored?

N

Are there DANGER notices and emergency exits?

Y

Does the glyphosate storage area have enough space for personnel to move around and receptacles to be transported

Y

Does it have a roof?

N

Good ventilation?

Y

Are there the following materials to control glyphosate spills?

Sawdust

Kg

Earth

ND

Kg

Lime

Kg

Detergents

Kg

Water

1000

Lt

Other: Spill control kit is provided in a 350l plastic drum (contains rags, absorbent pads, barriers, plastic bags and gloves, procedure manual)

14,4

Storage conditions

Tanks or containers used to store glyphosate and other chemicals

| MATERIAL                 | Qty | Cap     | Condition |
|--------------------------|-----|---------|-----------|
| Stainless steel          |     |         |           |
| Plastic                  | 2   | 500-gal | Good      |
| Unlined galvanized steel |     |         |           |
| Other                    |     |         |           |
| Plastic drums            | 20  | 55gal   | Good      |

15 MEANS OF HANDLING AND FIRST AID

15,1 No., of persona handling glyphosate

2

15,2 Do persons handling glyphosate apply the following precautions/warnings?

Prevent contact with eyes

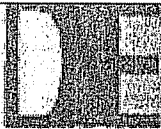
Y

Prevent contact with clothing

Y

Avoid breathing vapour or spray mist

Y

|  |             |  |           |
|--|-------------|--|-----------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 8/14 |
|  | RF2         | Industrial Safety Program for Operations Bases | Sheet 2   |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |        | BASE          |
|--------------|----------------|----------|-----|------|--------------|--------|---------------|
| Professional | Name           |          |     |      | Professional | Name   | Name - mobile |
| Env. audit.  | Jairo E. Pérez |          |     |      |              | Consec |               |

|   |   |
|---|---|
| Wash hands before eating, drinking, chewing gum, smoking or using the toilet  | Y |
| Change clothing contaminated with herbicide and wash thoroughly with soap     | Y |
| Avoid contamination of water by eliminating wastewater from washing equipment | Y |

|      |  |   |
|------|--|---|
| 16,3 | Number of intoxications with glyphosate presented by |   |
|      | Inhalation   | 0 |
|      | Contact with eyes                                    | 0 |
|      | Contact through skin                                 | 0 |
|      | Ingestión  | 0 |

|      |  |   |
|------|--|---|
| 16,4 | No. of times medical attention requested | 0 |
|------|--|---|

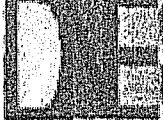
|      |  |   |
|------|--|---|
| 16   | <b>MEASURE TO COMBAT SPILLS</b>                    |   |
| 16,1 | No. of persons manipulating glyphosate at the base | 2 |
| 16,2 | No. of persons with complete safety equipment      | 2 |
|      | Missing items                                      |   |
|      | Helmet   |   |
|      | Gloves   |   |
|      | Respirator   |   |
|      | Face mask  |   |
|      | Goggles  |   |
|      | Overalls   |   |
|      | Rubber trousers and boots                          |   |
|      | Other: Helmet                                      |   |
|      | Gloves   |   |

|      |  |   |
|------|--|---|
| 16,3 | Number of nearby water sources contaminated during the period. | 0 |
|      |  |   |
|      |  |   |

|      |   |  |
|------|---|--|
| 16,4 | Number of herbicide spills occurring during the period. |  |
|      | Description of actions taken to correct contamination   |  |
|      | ND  |  |
|      | 1)  |  |
|      | 2)  |  |
|      | 3)  |  |

Describe final disposal of the material used as the absorbent

Description :

|   |             |   |           |
|---|-------------|---|-----------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 9/14 |
|   | RF2         | Industrial Safety Program for Operations Base | Sheet 2   |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
|--------------|----------------|----------|-----|------|--------------|------|---------------|--|
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec        |  |

17 FIREFIGHTING MEASURES

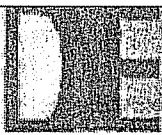
- 17,1 Regularity of cleaning and tidying the premises Daily, covering operations zone and platform
- 17,2 Number of checks on electrical installations N/A, because there are no administration offices or hangars
- 17,3 Does for fire alarm system work? Y
- 17,4 No of extinguishers at the Base (state whether A, B, C or D or N/K)

| Location                                | Qty | Type |
|---|-----|------|
| Herbicide store                         |     |      |
| Filling area (pumps)                    |     |      |
| Herbicide pump                          |     |      |
| Cafeteria                               |     |      |
| Kitchen                                 |     |      |
| Fuel stores                             | 2   | ABC  |
| Hangars                                 |     |      |
| Office                                  | 2   | ABC  |
| Aircraft parking area                   |     |      |
| Other                                   |     |      |
| TAME airport has firefighting equipment |     |      |

- 17,5 Latest inspection Jan 2003
- 17,6 Expires Jan 2004
- 17,7 Last recharged Jan 2003
- 17,8 Date of latest training for personnel on handling December 2002

18 MEASURES FOR GUERRILLA ARRACK INVOLVING GLYPHOSATE

- 18,1 Hard wall height around glyphosate storage area
- Glyphosate storage area wall material (concrete, breezeblock, metal etc) Open air
- 18,2 Condition of waste evacuation system To be implemented (Note that this is a mobile base)
- 18,3 No of available receptacles with lids to collect up liquids in the event of combat 10
- 19 WASHING OF AIRCRAFT AND MAINTENANCE OF MIXING EQUIPMENT
- 19,1 Washing alter spraying operations
- Is the washing place far from water sources? Y
- No. of washing places 1
- Is there a special system for discharging this wastewater N
- Latest maintenance for discharge system -
- Is the absence of herbicide checked prior to washing? Y

|   |             |  |            |
|---|-------------|--|------------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 10/14 |
|   | RF2         | Industrial Safety Program for Operations Bases | Sheet 2    |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |  |
|--------------|----------------|----------|-----|------|--------------|------|---------------|--|
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |  |
| Env- audit.  | Jairo E. Pérez |          |     |      |              |      | Consec        |  |

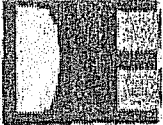
NOTE. Glyphosate hoppers are only emptied for repairs or overhauls  
 19,2 Maintenance of mixing equipment  
 Frequency of maintenance to avoid leaks of pure and mixed substances.

|             |                      |
|-------------|----------------------|
| Doser       | As marked            |
| Mixing tank | Per losses/leaks     |
| Joints      | Per per Losses/leaks |
| Hoses       | Per Losses/leaks     |
| Nozzles     | Per losses/leaks     |

Other

|      |  |   |
|------|--|---|
| 20   | GENERAL MEASURES   |   |
| 20,1 | Frequency of relief of personnel   | 8-15 days                                     |
| 20,2 | Are unauthorized personnel allowed to stay in the storage area   | NO  |
| 3    | Are unauthorized personnel allowed access to aircraft, maintenance shops or parking areas?   | N   |
| 4    | Are all electrical installations explosion-proof?  | N.  |
| 5    | Is smoking allowed in working areas?   | N   |
| 6    | No of cases of drug/hallucinogens consumption at the workplace   | 0   |
| 7    | No of civilians carrying weapons in work areas   | 0   |
| 8    | No of cases reported of trading with Program goods   | 0   |
| 9    | Date of latest Comprehensive Security training for employees   | 12/2002                                       |
| 10   | Person responsible for induction for each new employee   | Capt Miguel Tunjano                           |
|      | No of persons responsible for monitoring safety compliance   | 2   |
|      | Are workers given Procedure Manuals for their Jobs in welding, electricity, excavation, load lifting, materials storage and work at altitude | PECIG activity procedure are delivered        |
|      | Name Manuals   | See Larandia sheets                           |
|      | Note: Non-PECIG activities are contracted out, and contractors are responsible for their own personnel.                                      |   |
| 11   | Is there signposting and demarcation for each working area and access route? Areas and routes lacking signposting and demarcation            | Partial (Areas are lent temporarily to PECIG) |

Due to airport administration restrictions, no other type of signposting ,may be used

|   |             |  |            |
|---|-------------|--|------------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 11/14 |
|   | RF2         | Industrial Safety Program for Operations Bases | Sheet 1    |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |
|--------------|----------------|----------|-----|------|--------------|------|---------------|
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec        |

20,12 Reports attached of technical checks on vehicles, aircraft, equipment, materials, installations, procedures and systems:  
 1) Reports of technical checks on vehicles, aircraft, equipment, materials, installations, procedures and systems and kept by Dyncorp and DIRAN:  
 2)

20,13 Is there an operations investigation program to minimize operations base accidents? **Y**  
 NOTE: ARAVI Aviation Area) is responsible for industrial safety matters and air safety. Dyncorp also has these two areas.

20,14 Is there constant compliance with Decree 1843/1993 for the use and handling of pesticide **Y1**  
 In what respect has there been non-compliance?  
 Since the Base is transitory, matters such as herbicide storage and washing of equipment have not been fully observed

20,15 Are there forms to control established measures (attach the latest of each) **Controls are currently kept in notebooks**

20,16 Control and prevention programs for personnel engaged in mixing and filling.

| Program name | Date started | Duration |
|--------------|--------------|----------|
|              |              |          |
|              |              |          |

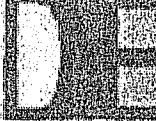
20,17 Description of methods to check understanding of and compliance with base COs  
 Measures and rules transmitted as orders, manuals or talks, and are mandatory  
 Contracted personnel are contacted by memorandum, and technical manuals for each function are delivered.

20,18 Regular medical examinations for personnel engaged in mixing and other platform activities

| Name of examination | No of personnel examined |
|---------------------|--------------------------|
|                     |                          |
|                     |                          |

20,19 Base supervisión of spraying-related activities (attach report)

| Name of Operatoins Base visited | Date     | Report? (Y/N)                                |
|---------------------------------|----------|--|
| Tame Mobile                     | 23/10/03 | Ministry of Housing and Regional Development |

|  |             |  |            |
|--|-------------|--|------------|
|  | MPMA-112001 | ENVIRONMENTAL MANAGEMENT PLAN                  | Page 12/14 |
|  | RF2         | Industrial Safety Program for Operations Bases | Sheet 2    |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE          |
|--------------|----------------|----------|-----|------|--------------|------|---------------|
| Professional | Name           |          |     |      | Professional | Name | Tame - mobile |
| Env.-Audit   | Jairo e. Pérez |          |     |      |              |      | Consec        |

21 COMMANDER OF THE SPRAYING BASE

21,1 Description of procedures used to teach personnel to dose mixtures, in respect of rules and regulations

ARECI issues orders, rules and regulations for Operations Base personnel to perform their particular functions

21,2 Description of procedure employed to disseminate rules, regulations and manuals for the use and handling of chemicals

Each operator has a folder containing his functions, rules and procedures. Talks and update courses are given regularly.

21,3 Is there care to comply with technical and environmental conditions suggested by Environmental Audit. Y

21,4 How often is there supervision of mixing of the herbicide and calibration of equipment? Daily

21,5 Description of procedure to coordinate the sending of spraying polygrams to DIRAN, with reports of new developments.

DIRAN has a polygram form to be completed by the Secretary of the Operations Base. It is signed by the COI of the Operations Base or the ARECI Coordinator and faxed to the DIRAN-Bogotá radio office. Originals are then regularly sent to ARECI Bogotá, for filing

22 HERBICIDE MIXING TECHNICIAN

22,1 No of workers mixing at the Base 2

22,2 % of mixers not using protective equipment 0%

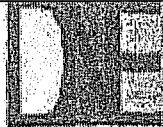
22,3 Reports on deficiencies in workings or maintenance or leaks

| Deficiency | Equipment | Date |
|------------|-----------|------|
|            |           |      |
|            |           |      |

22,4 Are accounts kept of mixing operations? Y

22,5 Date of re-conditioning of storage area, signposting, demarcation of zones. \_\_\_\_\_

COMMENTS

|   |                |                                |          |
|---|----------------|--------------------------------|----------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN  | Page 1/5 |
|   | RF3            | Solid Waste Management Program | Sheet 3  |
| COMPLETION  |                |                                |          |
| Professional  | Name           | REVISION                       | No.      |
| Env. audit.   | Jairo E. Perez |                                |          |
| APPROVAL  |                | BASE                           |          |
| Professional  | Name           | Professional                   | Name     |
|   |                |                                | Consec   |

Period of evaluation 1/11/2003 – 30/11/2003

Note: Enter "ND" if no information is available

**1 DATA OF OPERATIONS BASE**

|     |   |                                   |
|-----|---|-----------------------------------|
| 1,1 | Name of base                                    | Tame mobile Antinarcotics airbase |
| 1,2 | Municipality:                                   | Tame                              |
|     | Department                                      | Arauca                            |
| 1,3 | Person responsible for environmental management | Capt Miguel Tunjano               |

**2 CHARACTERISTICS OF THE BASE**

|     |  |                     |
|-----|--|---------------------|
| 2,1 | Normal headcount                           | 40                  |
| 2,2 | Days' operations in this period            | 13                  |
| 2,3 | Hours of spraying operation in this period | 85.9 (flying hours) |

**3 CONSUMPTION OF MATERIALS, FUEL, ENERGY**

|     |                           |                                  |          |      |
|-----|---------------------------|----------------------------------|----------|------|
|     | Description               | Roundup                          | 8319.96  | Gals |
| 3,1 | Glyphosate (50 gal drums) |                                  |          |      |
|     | Coadjuvants               | Cosmoflux F411                   | 190.77   | Gals |
|     | Water in mix              |                                  | 10498.46 | Gals |
|     | Grease, oil, lubricants   | Oil for aircraft and helicopters | ND       |      |
|     | Paint and accelerants     |                                  |          |      |
|     | Solvents                  |                                  |          |      |
|     | Other                     |                                  |          |      |
|     | :                         |                                  |          |      |
| 3,2 | Fuel                      | JP (for aircraft)                | ND       |      |
|     | Gasolina                  |                                  | ND       |      |
|     | Gas                       |                                  | ND       |      |
|     | Other:                    |                                  |          |      |
| 3,3 | Electricity               |                                  | ND       | Kw/h |

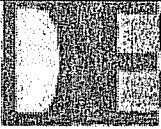
**4 DATA OF SPRAYING OPERATION**

|     |                                       |             |
|-----|---------------------------------------|-------------|
| 4,1 | No of spraying flights in this period | 59          |
| 4,2 | Area sprayed                          | 3,052.36 ha |

**5 ORIGIN AND PRODUCTION OF WASTE**

|     |     |                |    |      |
|-----|-----|----------------|----|------|
|     |     | DESCRIPTION    |    |      |
| 5,1 | DSW | Organic matter | Kg | 2400 |
|     |     | Paper          | Kg | ND   |
|     |     | Cardboard      | Kg | ND   |



|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 2/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

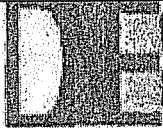
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |  |
|--------------|----------------|----------|-----|------|--------------|------|--------|--|
| Professional | Name           |          |     |      | Professional | Name | Name   |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |  |

|     |     |                              |            |       |
|-----|-----|------------------------------|------------|-------|
| 5,2 |     | Glass                        | Kg         |       |
|     |     | Plastic                      | Kg         |       |
|     |     | Rubber                       | Kg         |       |
|     |     | Wood                         | Kg         |       |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 8400  |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 10800 |
| 5,3 | SSW | Construction rubble          | Kg         | 0     |
|     |     | Packaging                    | Kg         | 0     |
|     |     | Mixtures                     | Kg         | 0     |
|     |     | Grease and oil               | Kg         | ND    |
|     |     | Metal shavings               | Kg         | 0     |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | ND    |
| 5,3 | RSA | 55 gallon drums              | drums      | 152   |
|     |     | 5 gallon plastic receptacles | Receptacle | 39    |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 191   |

Note: Quantities of DSW and SSW are estimated since no records of quantities are kept at the Base

## 6 GENERAL DATA OF SOLID WASTE MANAGEMENT

|      | Description  |       |                       |
|------|--|-------|-----------------------|
| 6,1  | Offices, camps, restaurants, maintenance workshops separating and storing domestic and special waste separately  | 0     |                       |
| 6,2  | Provisional domestic and special waste receptacles with lids   | 4     |                       |
| 6,3  | Monthly burning of waste   | 0     |                       |
| 6,4  | No of times refuse collected   | Daily |                       |
| 6,5  | No of times refuse collected in public places, worksites, ditches etc.   | Daily |                       |
| 6,6  | Sites for disposal of all or part of waste in environmentally sensitive places   | 0     |                       |
| 6,7  | Places for waste disposal protected from wind action, distant from water sources or currents and away from human settlements.  | 1     |                       |
| 6,8  | Places for waste disposal with means of control such as external channels  | 0     |                       |
| 6,9  | Marked receptacles containing special or hazardous waste indicating characteristics of the product and the danger run if receptacle is opened.<br>Note: Solid waste levels are minimal since the airport only handles aircraft maintenance and mixing and foiling of herbicide | 0     |                       |
| 6,10 | Program for separation at source of materials such as paper, metal and glass (recyclable) from other waste during (months).  | 1     | Start date 01/02/2003 |

|   |      |                                |          |
|---|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 3/5 |
|   | RF3  | Solid Waste Management Program | Sheet 3  |

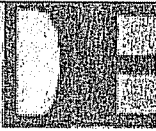
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Tame   |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec |

|      |   |                  |                                  |
|------|---|------------------|----------------------------------|
| 6,11 | No of receptacles available to make separation at source.   | 4 (oil and fuel) | Receptacles                      |
| 6,12 | Are personnel environmentally aware and do they participate in the program for separation at source?.     | 70               | % of personnel                   |
| 6,13 | No of storage places available for temporary storage of waste   | 0                | Distribution: Hangars and stores |
| 6,14 | Area occupied by storable special solid waste (herbicide drums and receptacles in the stores)             | 40               | M2                               |
| 6,15 | No of 55-gallon drums on each compartment for special waste for temporary disposal of classified waste    | 4(oil and fuel)  | Drums/bins                       |
| 6,16 | No of times a month that non-recoverable waste is taken directly to the infill or approved disposal site. | 25-30            | Times/month                      |

#### 7 DOMESTIC SOLID WASTE (DSW) MANAGEMENT PLAN

Data for this period only

|     | Description  | Qty   | Comments   |
|-----|--|-------|--|
| 7,1 | Receptacles for collection and separation in situ of existing waste in each Base working area                                      | 4     |  |
| 7,2 | Training for personnel working at the Base, security personnel, visitors, regarding work in separation of waste at source.         | 0     | Training is given by ARECI personnel in rotation round operations bases. |
| 7,3 | No of times a month that organic waste (waste food) is taken to the infill of the nearest municipality.                            | -     | There is no organic waste  |
| 7,4 | No of days that inorganic waste remains in temporary disposal sites prior to removal to the tip                                    | 2-4   | No bad odours are generated  |
| 7,5 | No of times that supervision plans and mechanisms are used to control hygiene and avoid the production of smells and other vectors | Daily |  |
| 7,6 | No of times a month that recyclable solid waste is delivered to municipal recycling cooperatives                                   | 0     |  |
| 7,7 | % compliance with disposal and final treatment of DSW  | 60    | % refers to DSW at the Base (Tame Platform)                              |

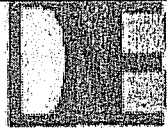
|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 4/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |  |
|--------------|----------------|----------|-----|------|--------------|------|--------|--|
| Professional | Name           |          |     |      | Professional | Name | Name   |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |  |

8. MANAGEMENT PLAN FOR SPECIAL SOLID WASTE (SSW)

Data for this period only

|      | Description   |    |   |
|------|---|----|---|
| 8,1  | Oil changes in vehicles, aircraft and machinery off base  | 0  |   |
| 8,2  | 55-gallon drums storing burnt oil from machinery, vehicles, plant or workshops  | 4  | Kit has 4 55-gallon drums                                       |
| 8,3  | Metal or plastic drums not in good condition and being used for storage of SSW  | 0  |   |
| 8,4  | No of times that classification and separation of SSW at origin has failed  | ND | Records to be implemented                                       |
| 8,5  | Receptacles for special waste (red)   | 2  | 5-gallon metal bins with absorbent material                     |
| 8,6  | Receptacles for oily waste (black)  | 4  | Oil kit   |
| 8,7  | Kg of SSW disposed on in a security infill or incinerated   | 0  |   |
| 8,8  | No of sales of containers or other materials that have been in contact with chemicals or hydrocarbons after decontamination as directed by the manufacturer | 0  |   |
| 8,9  | No of used batteries stored on the Base   | 0  | Disposable batteries are in spares for aircraft and helicopters |
| 8,10 | Kg of metal waste selected, separated and sold for recycling  | 0  |   |
| 8,11 | Kg of Wood selected, separated and sold for recycling   | 0  |   |
| 8,12 | Kg of hazardous substances used and transformed at the time of disposal in toxic elements   | 0  |   |
| 8,13 | No of accidental spills of special chemicals  | ND |   |
| 8,14 | Program activities that reuse metal, plastic and rubber waste.  | 0  | None  |
| 8,15 | Names of specialized companies authorized to eliminate waste oil and grease   | 0  | Dyncorp is responsible  |
| 8,16 | Names of used substances or products that contain asbestos, chlorates, lithium batteries, PCBs and mercury  | 0  |   |

|   |      |                                |          |
|---|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 5/5 |
|   | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Name   |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |

|      |  |   |                                 |
|------|--|---|---------------------------------|
| 8,17 | Names of contractors responsible for control, handling and conditioning of areas affected by accidental spills of special chemicals. |   | Activities of DIRAN and DYNCORP |
| 8,18 | Last time returned to supplier of hazardous substances   |   | DD/MM/YY                        |
| 8,19 | Names of hazardous substances used and transformed at the time of disposal in toxic elements.  | 0 |                                 |

Note: Herbicide containers are used to build barricades and defences of the Operations Base.

#### 9 MANAGEMENT PLAN FOR SOLID WASTE LINKED TO THE HANDLING OF GLYPHOSATE (REG)

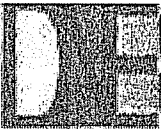
|     | Description  | Qty | Comments                    |
|-----|--|-----|-----------------------------|
| 9,1 | No of containers of glyphosate, surfactants and other products added into the formulation used as receptacles for waste after washing with water | 4   |                             |
| 9,2 | M2 occupied by REG in the compartment of the stores used for temporary disposal of recyclable waste  | 40  |                             |
| 9,3 | Litres of water used in washing receptacles at the base for reuse in aircraft tanks  | 0   | Mechanism to be implemented |
| 9,4 | No of containers sold or given away to local inhabitants   | 0   | DD/MM/YY                    |
| 9,5 | Last time the glyphosate distributor (Monsanto) collected and removed containers to special deposits.  | ND  |                             |

#### 10 FOLLOW-UP AND MONITORING

|      |   |  |   |
|------|---|--|---|
| 10,1 | Name and post of person effecting daily inspections of the temporary waste storage area (Attach reports or copies of notebooks) |  | The mixer is responsible for inspections. Patrolman T López |
| 10,2 | Name and post of person making inspections of Base installations to verify compliance with activities (attach reports)          |  | Base CO   |
| 10,3 | Name and post of the person making weekly follow-up of the recovery and recycling program.                                      |  | Patrolman Jimmy Guzmán                                      |

#### COMMENTS

Measures recommended by the Ministry of Environment, Housing and Regional Development are still pending adoption

|  |      |   |          |
|--|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 1/6 |
|  | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE        |  |
|--------------|----------------|----------|-----|------|--------------|------|-------------|--|
| Professional | Name           |          |     |      | Professional | Name | Tame mobile |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec      |  |

Evaluation: 01/11/03 to 30/11/03

1

### DATA OF OPERATIONS BASE

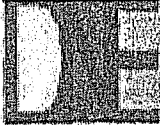
|     |  |                                |
|-----|--|--------------------------------|
| 1,1 | Name   | Tame mobile Antinarcotics Base |
| 1,2 | Location                                     | Tame airport                   |
|     | Municipality                                 | Tame                           |
|     | Department                                   | Arauca                         |
| 1,3 | Person responsible for environmental matters | Capt Miguel Tunjano            |

### 2 USE AND MANAGEMENT OF WATER

|     |  |                              |   |
|-----|--|------------------------------|---|
| 2,1 | Supply   |                              |   |
|     | The licence or permit to use water is valid until                      | ND                           |   |
|     | Used for processes and services  | 3.05cu.m./day<br>(processes) |   |
| 2,2 | Water source   |                              |   |
|     | Public supply  |                              |   |
|     | Well   | 39.74                        |   |
|     | Spring   |                              |   |
|     | Other (what)   |                              |   |
| 2,3 | Water consumption  |                              |   |
|     | Public supply  |                              |   |
|     | Well   | 39.74                        |   |
|     | Spring   |                              |   |
|     | Other (what)   |                              |   |
| 2,4 | Type of treatment given to water (at Base or in the municipal utility) |                              | There is a small treatment plant that filters and disinfects (sand-filter tank and activated carbon filter) |
| 2,5 | Water is recycled from   |                              |   |
|     | Industrial use   | 0                            |   |
|     | Tank washing   | 0                            |   |
|     | Other  |                              |   |

### 3 ORIGIN AND PRODUCTION OF WASTEWATER

| Description  | YES/NO |
|--|--------|
| 3,1 Is domestic wastewater generated by Base personnel during operation times?                                     | N      |
| 3,2 Is there water from washing installations that passes into the rainwater network?                              | N      |
| 3,3 Is there rainwater that goes into the collection system independently of sewage and evacuated out of the Base? | -      |
| 3,4 Is there water from aircraft tank washing contaminated with glyphosate?  | Y      |
| 3,5 General services currently available   |        |
| Generation of electricity  | N      |
| Workshops-Garages  | N      |

|   |                |   |     |      |              |          |
|---|----------------|---|-----|------|--------------|----------|
|  | MPMA           | ENVIRONMENTAL MANAGEMENT PLAN                 |     |      |              | Page 2/6 |
|   | RF4            | Wastewater Management Program for PECIG Bases |     |      |              | Sheet 4  |
| COMPLETION  |                | REVISION                                      | No. | DATE | APPROVAL     | BASE     |
| Professional  | Name           |   |     |      | Professional | Name     |
| Env. Audit  | Jairo E. Pérez |   |     |      |              | Consec   |

4 CAUSES OF GENERATION OF DISCHARGES

|     |   |    |
|-----|---|----|
| 4,1 | Generation of secondary products  | 0  |
|     | Quantity of mixture badly prepared due to wrong measurements                        | 0  |
|     | Quantity of mixture badly prepared due to contamination of equipment with catalysts | 0  |
|     | Quantity of mixture badly prepared due to equipment malfunction                     | ND |
|     | Quantity of mixture spilled in emergencies  | 0  |

4,2 Use of toxic materials

| Type           | Lts | Name |
|----------------|-----|------|
| Solvents       | ND  |      |
| Heavy metals   | 0   |      |
| Anticorrosives | ND  |      |
| Antifoam       | 0   |      |

4,3 Accidental loss or deterioration of materials/products

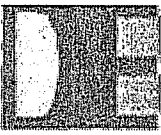
| Type                                      | Equipment  |
|---|--|
| Leaks into the soil                       | Might take place eventually at the herbicide mixing site |
| Evaporation of volatile organic compounds | N/A  |
| Other                                     |  |

4,4 Points and flows of discharge

| Location | Flow (cu,m./hour) | Origin           | Received by |
|----------|-------------------|------------------|-------------|
| Platform | ND                | Aircraft washing | Soil        |
|          |                   |                  |             |
|          |                   |                  |             |

4,5 Composition of drainage system at Base and contamination

| Description  | Y/N | Comments   |
|--|-----|--|
| Water free of oil and grease                                     |     |  |
| Rainwater with no oil, offices, stores                           | Y   |  |
| Accidentally contaminated water                                  |     |  |
| Rain or firefighting water not normally contaminated             | N   |  |
| Continually contaminated water                                   |     |  |
| Tank drainage, rain in mixing area, filling, etc                 | Y   | To be evaluated (rainwater captured on the platform might be contaminated) |
| Process water in contact with raw materials, storage, byproducts | N   |  |

|  |      |  |          |
|--|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                | Page 3/6 |
|  | RF4  | Wastewater Management Program at PECIG Bases | Sheet 4  |

|              |                |          |     |      |              |      |             |
|--------------|----------------|----------|-----|------|--------------|------|-------------|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE        |
| Professional | Name           |          |     |      | Professional | Name | Tame mobile |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec      |

|   |   |  |
|---|---|--|
| Water for hygiene uses similar to domestic use in cleaning offices, cafeterias, etc | Y |  |
|---|---|--|

4,6

## Segregation of effluent

| Type  | Y/N | Comments  |
|---|-----|---|
| Sewage  | Y   | Airport administration is responsible   |
| Rainwater                                     | ND  | To be established. There are no drawings of the airport platform                                      |
| Water with oil/grease                         | ND  | Oils and greases potentially produced correspond to the movements of all aircraft using this terminal |
| Mixture production process water              | N   |   |
| Aircraft tank washing water                   | N   |   |
| Water contaminated with glyphosate or mixture | N   |   |

4,7

## Characteristics of the rainwater system

| Description   | Y/N        | Condition         | Comment                                   |
|---|------------|-------------------|---|
| Contaminants are carried to soil or non-contaminated channels   | Eventually | To be established | Mixing and filling are closed systems     |
| The system collects rainwater from platform areas, gardens and sports facilities                            | ND         |                   |   |
| The system collects rainwater from internal roads, roofs administration, hangars, trailers and parking area | ND         |                   | Area separated from buildings and hangars |

ND No information available

5

## TREATMENT OF WASTEWATER

5,1

Treatment of wastewater at the Base

There is no treatment plant

Name wells, springs or other water sources contaminated by the wastewater treatment system

The gradient for the evacuation of effluent is

%

The wastewater treatment system is located at a distance from the Base of

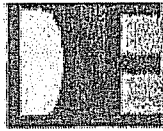
The wastewater treatment system is close to the well \_\_\_ spring \_\_\_ or other source at a distance of

metres

5,2

## Class of effluent treated

| Effluent                                      | Cu.m/day | Comments                         |
|---|----------|----------------------------------|
| Sewage  | ND       | Mobile base: uses airport system |
| Rainwater                                     | -        |                                  |
| Water with oil/grease                         | 0        |                                  |
| Mixture production process water              | 0        |                                  |
| Aircraft tank washing water                   | 0        |                                  |
| Water contaminated with glyphosate or mixture | 0        |                                  |

|   |      |  |          |
|---|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT 'PLAN                 | Page 4/6 |
|   | RF4  | Wastewater ;Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |  |
|--------------|----------------|----------|-----|------|--------------|------|--------|--|
| Professional | Name           |          |     |      | Professional | Name | Tame   |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |  |

5,3 Base Purifying Plant (if any)  
Plant type \_\_\_\_\_  
Types of effluent treated \_\_\_\_\_  
Available surface for plant \_\_\_\_\_  
Treatment Capacity \_\_\_\_\_  
Yield in Purification \_\_\_\_\_

5,4 Special Liquid Waste (SLW) This refers to liquids contaminated with glyphosate or prepared mixture. The treatment given is:

Discharge into the public sewerage system  N   
Biological system  N   
Deep burial  N   
Chemical deactivation  N   
Note: surplus herbicide mix is recycled \_\_\_\_\_

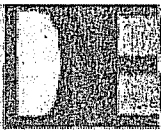
5,5 Domestic Liquid Waste (DLW)  
Discharged direct into the public system  Y   
Is treatment applied to DLW?  ND   
Treatment is .... \_\_\_\_\_  
Effluent parameters are \_\_\_\_\_  
Maximum capacity of treatment system \_\_\_\_\_  
Loads and main characteristics of the treatment system \_\_\_\_\_  
DBO load \_\_\_\_\_ Kg/day  
SS load \_\_\_\_\_ Kg/day  
Average retention time \_\_\_\_\_ Hours  
Maximum air flow \_\_\_\_\_ Cu.ft air/cu.m. day  
Recirculation \_\_\_\_\_ %  
DBO removal \_\_\_\_\_ %  
SST removal \_\_\_\_\_  
Maintenance as specified by builder \_\_\_\_\_  
Latest maintenance date  ND  DDMMYY  
Time of biological destabilization of the process and proliferation of unpleasant smells  ND  DDMMYY  
Note: No DLW is generated in the mixing and filling area for herbicides and fuels.

6 STUDY OF DISCHARGES

6,1 Wastewater is discharged from the whole Base to:  
Watercourse \_\_\_\_\_  
Public sewerage network \_\_\_\_\_  
Septic tanks \_\_\_\_\_  
Open ground \_\_\_\_\_

6,2 Expiry of discharge permit \_\_\_\_\_  
6,3 Latest verification of discharge quality  ND





MPMA

RF4

**ENVIRONMENTAL MANAGEMENT PLAN**

Wastewater management Program for PECIG Bases

Page 5/6

|              |                |          |     |      |              |      |        |  |
|--------------|----------------|----------|-----|------|--------------|------|--------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |  |
| Professional | Name           |          |     |      | Professional | Name | Tame   |  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |  |

6,5 Physical-Chemical and microbiological analysis on each discharge  
 Attach laboratory results  
 List of analysis results attached

| Discharge | Source | Date analyzed | Laboratory analyzing |
|-----------|--------|---------------|----------------------|
| 1         |        |               |                      |
| 2         |        |               |                      |

7 SLUDGE TREATMENT  
 Complete only if there is treatment of wastewater

8 THE ENVIRONMENTAL SITUATION

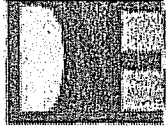
8,1 Discharges into watercourses? N, No discharges are made externally. Water is recycled and used in industrial processes (mixing, washing of equipment, offices etc.)

Expiry date of discharge 'permit \_\_\_\_\_  
 Name of receiving watercourse \_\_\_\_\_  
 Basin \_\_\_\_\_  
 Flow (cu.m./hour) \_\_\_\_\_  
 Average \_\_\_\_\_  
 Uses of water outside the Base \_\_\_\_\_  
 Minimum \_\_\_\_\_

|                             |          |                               |
|-----------------------------|----------|-------------------------------|
| Upstream                    |          |                               |
| Downstream                  |          |                               |
| Classification of discharge |          |                               |
| Description                 | Election | Comments                      |
| Contaminating               |          |                               |
| Non-contaminating           |          |                               |
| Potentially contaminating   |          |                               |
| Not evaluated               |          | To be clarified and evaluated |

8,2 Discharge into public sewerage network  
 Date of expiry of discharge permit DDMMYY  
 Capacity of Municipal purifier ND Cu.m./hour  
 Type of treatment given \_\_\_\_\_  
 Characteristics of municipal sewerage system \_\_\_\_\_

8,3 Discharge to septic tank N  
 Date of expiry of discharge 'permit \_\_\_\_\_ DDMMYY  
 Capacity of tanks installed to serve the Plant \_\_\_\_\_ Cu.ft  
 Age \_\_\_\_\_ Months  
 Condition (good, acceptable, bad) \_\_\_\_\_

|   |      |   |          |
|---|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 6/6 |
|   | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Time   |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |

Sludge cleaning period

(Annual, half yearly,  
quarterly, monthly, other)  
DDMMYY

Latest overflow date

\_\_\_\_\_

8,4 Other discharges existing in the area

Households in San Jose del Guaviare, airport, farms

8,5 Adverse effects of discharges

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9 FOLLOWUP AND MONITORING

9,1 Date of latest quarterly characterization of Basic sanitation parameters to test the effectiveness of the treatment system and compliance with regulations on discharges (attach the last two laboratory results)

October/03 DDMMAA

COMMENTS

|              |                |          |     |      |              |      |                |  |
|--------------|----------------|----------|-----|------|--------------|------|----------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE           |  |
| Professional | Name           |          |     |      | Professional | Name | Apiay - Mobile |  |
| Env Audit    | Jairo E. Perez |          |     |      |              |      | Consec         |  |

**GENERAL EVALUATION**

**ENVIRONMENTAL ZONING OF SPRAYING OPERATIONS**  
(inside the block)

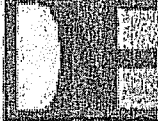
| AREAS ZONED  | Name   | Surface |    | Environmental treatment given |
|--|--|---------|----|-------------------------------|
|  |  | Ha      | %* |                               |
| Ecologically fragile<br>Nature Park  | Serranía La Macarena   | 630,000 |    | Exclusion                     |
|  | Tinigua  | 208,000 |    |                               |
|  | Sumapaz  | 154,000 |    |                               |
| Culturally fragile<br>Indigenous reservations  | Piapoco  | 4168    |    | Exclusion                     |
|  | Guahibio   | 8327    |    |                               |
|  | Acahgua  | 1957    |    |                               |
|  | Páez   | 1065    |    |                               |
|  | Guayabero  | 11037   |    |                               |
| Archaeological parks   |  |         |    |                               |
| Historic monuments   |  |         |    |                               |
| Environmentally sensitive<br>Bodies of water R Rivers<br>Q:Streams H: Wetlands<br>La: Lagoons L: Lakes | R Peñas, R. Cafre, Caño Casibare,<br>Caño Hondo, Caño Porori, Caño<br>Lagartijas, Caño La Cabra  | ND      |    | Exclusion                     |
|  |  | ND      |    |                               |
|  |  | ND      |    |                               |
| Native forest  |  |         |    |                               |
| Socially sensitive<br>Agglomerated human<br>settlements (towns,<br>villages, hamlets)**                | La Uribe (M), El Diviso, Mesetas<br>(M), El Oriente, La Guajira, El<br>Jardín de las Peñas, Mapiripán (M),<br>La Compañía, Puerto lleras (KM),<br>La Esperanza, Casibare, Puerto<br>Kiko, La Pradera, Puerto Rico (M),<br>El Turpial, Barranco Colorado,<br>VistaHermosa (M), Guani. | ND      |    | Exclusion                     |

\*% of total block area

\*\* State whether Cgto: Corregidor District, Cas: Hamlet, Insp Pol: Police District, M: Municipality. O: Other

**ENVIRONMENTAL ZONING (continued)**

| AREAS ZONED   | Name          | Surface |   | Environmental treatment |
|---|---------------|---------|---|-------------------------|
|   |               | Ha      | % |                         |
| Economically sensitive:<br>Infrastructure works:<br>roads, airports, river,<br>ports, seaports, dams,<br>power stations | APIAY airport | ND      |   | Exclusion               |
|   |               |         |   |                         |

|   |               |                                     |                   |
|---|---------------|-------------------------------------|-------------------|
|  | MPMA-112001   | ENVIRONMENTAL MANAGEMENT PLAN       | Page 4/8          |
|   | RF1-MOA       | Spraying operations management plan | Sheet 1           |
| COMPLETION  |               | REVISION                            | No.               |
| Professional  | Name          | DATE                                | APPROVAL          |
| Env Audit   | Jairo-E.Perez |                                     | Professional Name |
|   |               |                                     | BASE              |
|   |               |                                     | Apiay - Mobile    |
|   |               |                                     | Consec            |

### GENERAL EVALUATION

|   |  |    |  |              |
|---|--|----|--|--------------|
| Manual eradication agreements           |  |    |  |              |
| Alt Devpt Plan Productive Project areas |  |    |  |              |
| Irrigation/drainage areas               |  |    |  |              |
| Industrial zones                        |  |    |  |              |
| Opencast mining operations              |  |    |  |              |
| Rural commercial tourism complexes      |  |    |  |              |
| Rural institutional complexes           |  |    |  |              |
| Environmental exclusion areas           |  | ND |  | Partial area |
| Total zoning areas                      |  | ND |  |              |

ND: No information available

#### 6.4 ANALYSIS OF SPRAYING RECORDS (attached)

Glyphosate spraying area records are as follows:

#### 6.5 GENERAL INFORMATION ON SPRAYING

|  |   |    |
|--|---|----|
| Are there spraying manuals at the operations base?   | YES   |    |
| Are there support escort for spray aircraft manuals at base  | YES   |    |
| Frequency of aircraft spraying equipment   | Mandatory every 50 and 100 hrs or if damage appears in the system |    |
| Frequency of general washing of spraying equipment   | Every 8 days, when required by blockage of nozzles                |    |
| Frequency of calibration of spraying equipment   | Daily (electronic)  |    |
| Are planning and evaluation meetings held  | YES   |    |
| No of training classes during the period for operators (stores, tanks) participating in operations | 0   |    |
| No of polygrams recorded during period   | 28  |    |
| No of records of spraying operations during period   | 14  |    |
| No of DelNorte recordings  | Valid   | 73 |
|  | Failed/malfunction  |    |
| Does pilot know processes, rules, restrictions on spraying processes?                              | Yes   |    |
| Does pilot know environmental effects of PECIG substances applied?                                 | Yes   |    |
| Does pilot know effects on human and animal health of PECIG substances applied ?                   | Yes   |    |

RECORD OF AERIAL SPRAYING OF ILLICIT COCA-LEAF CROPS  
MOBILE BASE, APIAY, META  
PERIOD NOVEMBER 1-30, 2003

| No. | MISION   | AREA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>REPORTE (gl) | DEPARTAMENTO | MUNICIPIO     | OBSERVACIONES         |
|-----|----------|---------------------------|---|--------------|---------------|-----------------------|
| 1   | K07306AC | 21,92                     | 59,40   | META         | Puerto Lleras |                       |
| 2   | K0736HAC | 28,42                     | 87,56   | META         | Puerto Lleras |                       |
| 3   | K0732TAC | 24,80                     | 68,20   | META         | Puerto Lleras | Sin archivo magnetico |
| 4   | K0731YAC | 24,31                     | 68,64   | META         | Puerto Lleras |                       |
| 5   | K0734%AC | 13,23                     | 59,40   | META         | Puerto Lleras |                       |
| 6   | K08306AC | 24,00                     | 66,00   | META         | Puerto Lleras | Sin archivo magnetico |
| 7   | K08306BC | 23,64                     | 68,20   | META         | Puerto Lleras |                       |
| 8   | K08306CC | 24,00                     | 66,00   | META         | Puerto Lleras |                       |
| 9   | K0832HAC | 32,00                     | 88,00   | META         | Puerto Lleras | Sin archivo magnetico |
| 10  | K0832HBC | 38,40                     | 105,60  | META         | Puerto Lleras | Sin archivo magnetico |
| 11  | K0832HCC | 27,20                     | 118,80  | META         | Puerto Lleras | Sin archivo magnetico |
| 12  | K0831TAC | 14,21                     | 44,00   | META         | Puerto Lleras |                       |
| 13  | K0831TBC | 29,16                     | 83,60   | META         | Puerto Lleras |                       |
| 14  | K0831TCC | 15,75                     | 44,00   | META         | Puerto Lleras |                       |
| 15  | K0834YAC | 28,60                     | 73,92   | META         | Puerto Lleras |                       |
| 16  | K0834YBC | 41,74                     | 113,52  | META         | Puerto Lleras |                       |
| 17  | K0834YCC | 20,51                     | 58,52   | META         | Puerto Lleras |                       |
| 18  | K0836EAC | 11,68                     | 41,36   | META         | Puerto Lleras |                       |
| 19  | K0836EBC | 22,63                     | 67,32   | META         | Puerto Lleras |                       |
| 20  | K0836ECC | 20,00                     | 55,00   | META         | Puerto Lleras | Sin archivo magnetico |
| 21  | K09306AC | 0,36                      | 1,32  | META         | Puerto Lleras | Sin archivo magnetico |
| 22  | K0932HAC | 1,92                      | 5,28  | META         | Puerto Lleras | Sin archivo magnetico |
| 23  | K0934%AC | 1,18                      | 4,40  | META         | Puerto Lleras | Sin archivo magnetico |
| 24  | K0936EAC | 2,13                      | 8,36  | META         | Puerto Lleras | Sin archivo magnetico |
| 25  | K10326AC | 11,20                     | 30,80   | META         | Puerto Lleras | Sin archivo magnetico |
| 26  | K1034YAC | 10,65                     | 38,72   | META         | Puerto Lleras |                       |

Key  
Misión  
Area asperjada  
Herbicida gastado según reporte (gal)  
DeparApiaynto  
Municipio  
Observaciones  
Sin archivo magético

Mission  
Area sprayed  
Herbicide used (per report) (gal)  
Department  
Municipality  
Comments  
No magnetic file

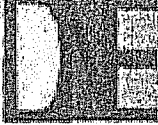
| No. | MISION   | AREA ASPERJADA (ha) | HERBICIDA GASTADO SEGUN REPORTE (gl) | DEPARTAMENTO | MUNICIPIO               | OBSERVACIONES         |
|-----|----------|---------------------|--------------------------------------|--------------|-------------------------|-----------------------|
| 27  | K1036EAC | 12,40               | 47,52                                | META         | Puerto Lleras           |                       |
| 28  | K11306AC | 33,84               | 110,00                               | META         | Puerto Lleras - Mesetas |                       |
| 29  | K11306BC | 10,22               | 30,80                                | META         | Puerto Lleras           |                       |
| 30  | K11306CC | 35,86               | 92,40                                | META         | La Uribe                |                       |
| 31  | K1132%AC | 34,72               | 95,48                                | META         | Puerto Lleras           | Sin archivo magnético |
| 32  | K1132%BC | 11,20               | 30,80                                | META         | Puerto Lleras           | Sin archivo magnético |
| 33  | K1132%CC | 48,00               | 132,00                               | META         | Puerto Lleras           | Sin archivo magnético |
| 34  | K1131TAC | 33,15               | 88,00                                | META         | Puerto Lleras           |                       |
| 35  | K1131TBC | 6,27                | 24,20                                | META         | Puerto Lleras           |                       |
| 36  | K1131TCC | 28,93               | 79,64                                | META         | La Uribe - Mesetas      |                       |
| 37  | K1134YAC | 39,78               | 110,00                               | META         | Puerto Lleras           |                       |
| 38  | K1134YBC | 14,46               | 45,32                                | META         | Puerto Lleras           |                       |
| 39  | K1134YCC | 48,21               | 133,76                               | META         | La Uribe - Mesetas      |                       |
| 40  | K1136EAC | 33,84               | 108,68                               | META         | Puerto Lleras           |                       |
| 41  | K1136EBC | 10,22               | 29,04                                | META         | Puerto Lleras           |                       |
| 42  | K1136ECC | 35,86               | 101,20                               | META         | La Uribe - Mesetas      |                       |
| 43  | K13345AC | 8,14                | 24,20                                | META         | Mesetas                 |                       |
| 44  | K1330CAC | 11,04               | 30,36                                | META         | Mesetas                 | Sin archivo magnético |
| 45  | K1331RAC | 8,13                | 23,76                                | META         | Mesetas                 |                       |
| 46  | K1336&AC | 8,18                | 36,96                                | META         | Mesetas                 |                       |
| 47  | K16345AC | 0,85                | 2,64                                 | META         | Mesetas                 |                       |
| 48  | K1631OAC | 0,74                | 3,08                                 | META         | Mesetas                 |                       |
| 49  | K1636VAC | 1,28                | 4,84                                 | META         | Mesetas                 |                       |
| 50  | K17345AC | 12,07               | 37,40                                | META         | Mesetas                 |                       |
| 51  | K17345BC | 16,21               | 48,40                                | META         | Mesetas                 |                       |
| 52  | K1731CAC | 23,27               | 65,56                                | META         | Mesetas                 |                       |
| 53  | K1731CBC | 22,08               | 60,28                                | META         | Mesetas                 |                       |
| 54  | K1736~AC | 17,73               | 50,60                                | META         | Mesetas                 |                       |
| 55  | K1736~BC | 18,58               | 50,16                                | META         | Mesetas                 |                       |
| 56  | K18345AC | 19,14               | 52,80                                | META         | La Uribe                |                       |
| 57  | K1831RAC | 17,96               | 51,92                                | META         | La Uribe                |                       |

Key: see previous page

| No.       | MISION    | AREA<br>ASPERJADA<br>(ha) | HERBICIDA<br>GASTADO<br>SEGUN<br>REPORTE (gl) | DEPARTAMENTO | MUNICIPIO                      | OBSERVACIONES         |
|-----------|-----------|---------------------------|---|--------------|--------------------------------|-----------------------|
| 58        | K1836QAC  | 14,77                     | 42,68   | META         | La Uribe                       |                       |
| 59        | K19345AC  | 18,06                     | 53,68   | META         | Mesetas                        |                       |
| 60        | K1936VAC  | 10,46                     | 35,64   | META         | Mesetas                        |                       |
| 61        | K1931CAC  | 22,42                     | 62,48   | META         | Mesetas                        |                       |
| 62        | K22345AC  | 49,08                     | 132,00  | META         | Mesetas                        |                       |
| 63        | K2231VAC  | 24,20                     | 74,36   | META         | Mesetas                        |                       |
| 64        | K2236CAC  | 17,81                     | 54,56   | META         | Mesetas                        |                       |
| 65        | K24345AC  | 48,84                     | 132,00  | META         | Mesetas                        |                       |
| 66        | K2436RAC  | 18,23                     | 57,20   | META         | Mesetas                        |                       |
| 67        | K2436RBC  | 19,20                     | 52,80   | META         | Mesetas                        | Sin archivo magnético |
| 68        | K2731%AC  | 41,25                     | 117,48  | META         | Puerto Rico - Vista<br>Hermosa |                       |
| 69        | K2736YAC  | 47,67                     | 143,00  | META         | Puerto Rico - Vista<br>Hermosa |                       |
| 70        | K27346ACa | 20,85                     | 57,20   | META         | Puerto Rico - Vista<br>Hermosa |                       |
| 71        | K27346ACb | 24,48                     | 67,76   | META         | Puerto Rico - Vista<br>Hermosa |                       |
| 72        | K3034EAC  | 1,54                      | 4,40  | META         | Puerto Rico                    |                       |
| 73        | K30316AC  | 3,72                      | 8,80  | META         | Puerto Rico                    |                       |
| <b>73</b> |           | <b>1518,58</b>            | <b>4423,76</b>                                |              |                                |                       |

Key: see previous page

Source: Dyncorp reports

|   |                |  |     |      |              |          |
|---|----------------|--|-----|------|--------------|----------|
|  | MPMA-112001    | ENVIRONMENTAL MANAGEMENT PLAN          |     |      |              | Page 5/8 |
|   | RF1-MOA        | Spraying operations management program |     |      |              |          |
| COMPLETION  |                | REVISION                               | No. | DATE | APPROVAL     |          |
| Professional  | Name           |  |     |      | Professional | Name     |
| Env. Audit  | Jairo E. Perez |  |     |      |              | Consec   |

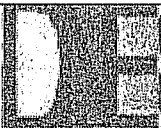
### GENERAL EVALUATION

#### 7 CLIMATIC DATA FOR SPRAYING IN THE PERIOD (November 2003)

| Days | Operation type | TEMPERATURE °C | Rel. Humidity | WINDS | Hours application | Comments                    |
|------|----------------|----------------|---------------|-------|-------------------|-----------------------------|
| 1    | No operation   |                |               |       |                   | Activities suspended        |
| 2    | No operation   |                |               |       |                   | Activities suspended        |
| 3    | No operation   |                |               |       |                   | Activities suspended        |
| 4    | No operation   |                |               |       |                   | Activities suspended        |
| 5    | No operation   |                |               |       |                   | Installation of base        |
| 6    | No operation   |                |               |       |                   | Installation of base        |
| 7    | Spraying       | ND             | ND            | ND    | 11.30-12-45       |                             |
| 8    | Spraying       | ND             | ND            | ND    | 8.35-14505        |                             |
| 9    | Spraying       | ND             | ND            | ND    | 11.05-12.40       |                             |
| 10   | Spraying       | ND             | ND            | ND    | 15.15-17.30       |                             |
| 11   | Spraying       | ND             | ND            | ND    | 8.30-15.30        |                             |
| 12   | No operation   |                |               |       |                   | Aircraft hit by gunfire     |
| 13   | No operation   | ND             | ND            | ND    | 12.40-14.35       |                             |
| 14   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 15   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 16   | No operation   | ND             | ND            | ND    | 13.12- 14.42      |                             |
| 17   | Spraying       | ND             | ND            | ND    | 8.30-14.05        |                             |
| 18   | Spraying       | ND             | ND            | ND    | 14.15-15.45       |                             |
| 19   | Spraying       | ND             | ND            | ND    | 10.15-12.05       |                             |
| 20   | Spraying       |                |               |       |                   | Preventive maintenance      |
| 21   | Spraying       |                |               |       |                   | Poor atmospheric conditions |
| 22   | Spraying       | ND             | ND            | ND    | 13.15-15.15       |                             |
| 23   | Spraying       |                |               |       |                   | Poor atmospheric conditions |
| 24   | Spraying       | ND             | ND            | ND    | 12.06-13.50       |                             |
| 25   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 26   | Spraying       |                |               |       |                   | Poor atmospheric conditions |
| 27   | Spraying       | ND             | ND            | ND    | 9.20-11-05        |                             |
| 28   | No operation   |                |               |       |                   | Poor atmospheric conditions |
| 29   | Spraying       | ND             | ND            | ND    |                   | Poor atmospheric conditions |
| 30   | Spraying       |                |               |       | 7.55-9.40         |                             |

ND: No information available from DIRAN





MPMA-112001

ENVIRONMENTAL MANAGEMENT PLAN

Page 6/8

RF1-MOA

Spraying operations management program

Sheet 1

| COMPLETION   |               | REVISION | No. | DATE | APPROVAL     |      | BASE           |  |
|--------------|---------------|----------|-----|------|--------------|------|----------------|--|
| Professional | Name          |          |     |      | Professional | Name | Apiay - Mobile |  |
| Env. Audit   | Jairo E.Perez |          |     |      |              |      | Consec         |  |

CONSOLIDATED SPRAYING AREAS DURING THE PERIOD (November 2003)

| Department | Municipalities | Inspection / Corregidor district | Area (ha) of coca | Aircraft PNC No., | Comments |
|------------|----------------|----------------------------------|-------------------|-------------------|----------|
|------------|----------------|----------------------------------|-------------------|-------------------|----------|

COMMENTS

On November 11, 2003 PNC0722 was hit by gunfire at N03°17'22" W 74°16 '20" in Mesetas, El Oriente  
 On November 30, 2003 PNC 0700 and 0506 were hit by gunfire at N02°46'00" W 73°13 '09" in Puerto Rico (Barranco Colorado), and a technician was wounded

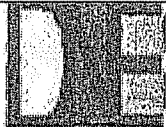
0 CROP SPRAYING

,1 Type of crop sprayed-COCA-LEAF

,2 Type of aircraft used AT 802

,3 Operating parameters (Average for the period)

| Parameter                       | Unit         | Value/range | Verification |
|---------------------------------|--------------|-------------|--------------|
| FLIGHT ALTITUDE                 | M            | <50         | 439 asl      |
| Dosage                          | l/ha         | 10.4        | 10.4         |
| Windspeed                       | Knots        | <5          | ND           |
| Airspeed                        | MPH          | -           | 171.4        |
| Drift                           | Knots (OV10) | <5          | <5           |
| Compliance with exclusion zones |              |             | Y            |
|                                 |              |             |              |

|   |               |  |          |
|---|---------------|--|----------|
|  | MPMA          | ENVIRONMENTAL MANAGEMENT PLAN          | Page 7/8 |
|   | RF1           | Spraying operations management program | Sheet 1  |
| COMPLETION  |               | REVISION                               | No.      |
| Professional  | Name          |  | DATE     |
| Env- Audit  | Jairo E.Lopez |  |          |
| APPROVAL  |               | BASE                                   |          |
| Professional  | Name          | San José del Guaviare                  |          |
|   |               | Consec                                 |          |

**GENERAL EVALUATION**

**11 COMPLIANCE WITH AIR SAFETY**

|      |                                     | PILOTS |       |        |
|------|-------------------------------------|--------|-------|--------|
| 11,1 | Pilot rules                         | Name   | Name  | Name   |
|      |                                     | Benson | Byler | Fulton |
|      | Has licence?                        | Y      | Y     | Y      |
|      | Crew knows spraying process manual? | Y      | Y     | Y      |

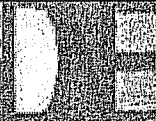
|  |                                     | PILOTS |         |         |
|--|-------------------------------------|--------|---------|---------|
|  |                                     | Name   | Name    | Name    |
|  |                                     | Lane   | Shadows | Roberts |
|  | Has licence?                        | Y      | Y       | Y       |
|  | Crew knows spraying process manual? | Y      | Y       | Y       |

|  |                                     | PILOTS     |            |              |
|--|-------------------------------------|------------|------------|--------------|
|  |                                     | Name       | Name       | Name         |
|  |                                     | Miller     | Coker      | Isaac Landry |
|  |                                     | Lineberger | MacPherson |              |
|  | Has licence?                        | Y          | Y          |              |
|  | Crew knows spraying process manual? | Y          | Y          | Y            |

Note: ND No information available

**11,2 Operating safety rules**

| Variables  | Response |
|--|----------|
| Type of environmental contingency arising and recorded during missions | 0        |

|  |      |  |          |
|--|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN          | Page 8/8 |
|  | RF1  | Spraying operations management program | Sheet 1  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE         |  |
|--------------|----------------|----------|-----|------|--------------|------|--------------|--|
| Professional | Name           |          |     |      | Professional | Name | Apiay mobile |  |
| Env. Audit   | Jairo E. López |          |     |      |              |      | Consec       |  |

**GENERAL EVALUATION**

|   |      |
|---|------|
| Status of DelNorte system in aircraft used in spraying                                | Good |
| Pilots know flight techniques and products required for safe operation?               | Y    |
| Crew know the effects of products sprayed on biota and care to be used in application | Y    |

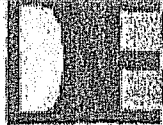
**3 General Information**

No of paramedics taking part in operations 1  
 Is technical support available to base? Y

**4 Type of recommendations received when mission completed by:**

| Type   | Document remittal code |
|--|------------------------|
| Environmental Audit                          |                        |
| Environmental Audit                          |                        |
| Ministry of Housing and Regional Development |                        |
| National Narcotics Directorate               |                        |
| ICA  |                        |
| Other  |                        |

**5 OTHER DEVELOPMENTS TO REPORT**

|   |      |                                |          |
|---|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 1/5 |
|   | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env. audit.  | Jairo E. Perez |          |     |      |              |      | Consec |

Period of evaluation 1/11/2003 – 30/11/2003

Note: Enter "ND" if no information is available

**1 DATA OF OPERATIONS BASE**

1,1 Name of base Apiay mobile Antinarcotics airbase  
 1,2 Municipality: Apiay Military Airport, Apiay,  
 Department Meta  
 1,3 Person responsible for environmental Capt Miguel Tunjano  
 management

**2 CHARACTERISTICS OF THE BASE**

2,1 Normal headcount 30  
 2,2 Days' operations in this period 14  
 2,3 Hours of spraying operation in this period 120.1 (flying hours)

**3 CONSUMPTION OF MATERIALS, FUEL, ENERGY**

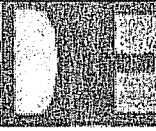
|                               |                                  |         |      |
|-------------------------------|----------------------------------|---------|------|
| Description                   | Roundup                          | 4423.76 | Gals |
| 3,1 Glyphosate (50 gal drums) |                                  |         |      |
| Coadjuvants                   | Cosmoflux F411                   | 94.91   | Gals |
| Water in mix                  |                                  | 5222.94 | Gals |
| Grease, oil, lubricants       | Oil for aircraft and helicopters | ND      |      |
| Paint and accelerants         |                                  |         |      |
| Solvents                      |                                  |         |      |
| Other                         |                                  |         |      |
| :                             |                                  |         |      |
| 3,2 Fuel                      | JP (for aircraft)                | ND      |      |
| Gasolina                      |                                  | ND      |      |
| Gas                           |                                  | 0       |      |
| Other:                        |                                  |         |      |
| 3,3 Electricity               |                                  | ND      | Kw/h |

**4 DATA OF SPRAYING OPERATION**

4,1 No of spraying flights in this period 73  
 4,2 Area sprayed 1,518.58 ha

**5 ORIGIN AND PRODUCTION OF WASTE**

|     | DESCRIPTION |                |         |
|-----|-------------|----------------|---------|
| 5,1 | DSW         | Organic matter | Kg 2400 |
|     |             | Paper          | Kg ND   |
|     |             | Cardboard      | Kg ND   |

|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 2/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

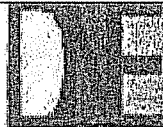
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |

|     |     |                              |            |       |
|-----|-----|------------------------------|------------|-------|
| 5,2 |     | Glass                        | Kg         |       |
|     |     | Plastic                      | Kg         |       |
|     |     | Rubber                       | Kg         |       |
|     |     | Wood                         | Kg         |       |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 8400  |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 10800 |
| 5,2 | SSW | Construction rubble          | Kg         | 0     |
|     |     | Packaging                    | Kg         | 0     |
|     |     | Mixtures                     | Kg         | 0     |
|     |     | Grease and oil               | Kg         | ND    |
|     |     | Metal shavings               | Kg         | 0     |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | ND    |
| 5,3 | RSA | 55 gallon drums              | drums      | 152   |
|     |     | 5 gallon plastic receptacles | Receptacle | 39    |
|     |     | TOTAL AVERAGE FOR THE PERIOD |            | 191   |

Note: Quantities of DSW and SSW are estimated since no records of quantities are kept at the Base

## 6 GENERAL DATE OF SOLID WASTE MANAGEMENT

|      | Description  |       |                       |
|------|--|-------|-----------------------|
| 6,1  | Offices, camps, restaurants, maintenance workshops separating and storing domestic and special waste separately  | 0     |                       |
| 6,2  | Provisional domestic and special waste receptacles with lids   | 4     |                       |
| 6,3  | Monthly burning of waste   | 0     |                       |
| 6,4  | No of times refuse collected   | Daily |                       |
| 6,5  | No of times refuse collected in public places, worksites, ditches etc.   | Daily |                       |
| 6,6  | Sites for disposal of all or part of waste in environmentally sensitive places   | 0     |                       |
| 6,7  | Places for waste disposal protected from wind action, distant from water sources or currents and away from human settlements.  | 1     |                       |
| 6,8  | Places for waste disposal with means of control such as external channels  | 0     |                       |
| 6,9  | Marked receptacles containing special or hazardous waste indicating characteristics of the product and the danger run if receptacle is opened.<br>Note: Solid waste levels are minimal since the airport only handles aircraft maintenance and mixing and foiling of herbicide | 0     |                       |
| 6,10 | Program for separation at source of materials such as paper, metal and glass (recyclable) from other waste during (months).  | 1     | Start date 01/02/2003 |

|   |      |                                |          |
|---|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 3/5 |
|   | RF3  | Solid Waste Management Program | Sheet 3  |

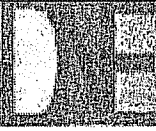
|              |                |          |     |      |              |      |        |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec |

|      |   |                  |                                  |
|------|---|------------------|----------------------------------|
| 6,11 | No of receptacles available to make separation at source.   | 4 (oil and fuel) | Receptacles                      |
| 6,12 | Are personnel environmentally aware and do they participate in the program for separation at source?.     | 70               | % of personnel                   |
| 6,13 | No of storage places available for temporary storage of waste   | 0                | Distribution: Hangars and stores |
| 6,14 | Area occupied by storable special solid waste (herbicide drums and receptacles in the stores)             | 20               | M2 to one side of the platform   |
| 6,15 | No of 55-gallon drums on each compartment for special waste for temporary disposal of classified waste    | 4(oil and fuel)  | Drums/bins                       |
| 6,16 | No of times a month that non-recoverable waste is taken directly to the infill or approved disposal site. | 4                | Times/month                      |

#### 7 DOMESTIC SOLID WASTE (DSW) MANAGEMENT PLAN

Data for this period only

|     | Description  | Qty   | Comments   |
|-----|--|-------|--|
| 7,1 | Receptacles for collection and separation in situ of existing waste in each Base working area                                      | 4     |  |
| 7,2 | Training for personnel working at the Base, security personnel, visitors, regarding work in separation of waste at source.         | 0     | Training is given by ARECI personnel in rotation round operations bases. |
| 7,3 | No of times a month that organic waste (waste food) is taken to the infill of the nearest municipality.                            | -     | There is no organic waste  |
| 7,4 | No of days that inorganic waste remains in temporary disposal sites prior to removal to the tip                                    | 2-4   | No bad odours are generated  |
| 7,5 | No of times that supervision plans and mechanisms are used to control hygiene and avoid the production of smells and other vectors | Daily |  |
| 7,6 | No of times a month that recyclable solid waste is delivered to municipal recycling cooperatives                                   | 0     |  |
| 7,7 | % compliance with disposal and final treatment of DSW  | 80    | % refers to DSW at the Base (Apiay Platform)                             |

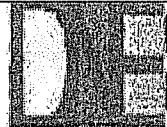
|  |      |                                |          |
|--|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 4/5 |
|  | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |

## 8 MANAGEMENT PLAN FOR SPECIAL SOLID WASTE (SSW)

Data for this period only

|      | Description   |    |   |
|------|---|----|---|
| 8,1  | Oil changes in vehicles, aircraft and machinery off base  | 0  |   |
| 8,2  | 55-gallon drums storing burnt oil from machinery, vehicles, plant or workshops  | 4  | Kit has 4 55-gallon drums                                       |
| 8,3  | Metal or plastic drums not in good condition and being used for storage of SSW  | 0  |   |
| 8,4  | No of times that classification and separation of SSW at origin has failed  | ND | Records to be implemented                                       |
| 8,5  | Receptacles for special waste (red)   | 2  | 5-gallon metal bins with absorbent material                     |
| 8,6  | Receptacles for oily waste (black)  | 4  | Oil kit   |
| 8,7  | Kg of SSW disposed on in a security infill or incinerated   | 0  |   |
| 8,8  | No of sales of containers or other materials that have been in contact with chemicals or hydrocarbons after decontamination as directed by the manufacturer | 0  |   |
| 8,9  | No of used batteries stored on the Base   | 0  | Disposable batteries are in spares for aircraft and helicopters |
| 8,10 | Kg of metal waste selected, separated and sold for recycling  | 0  |   |
| 8,11 | Kg of Wood selected, separated and sold for recycling   | 0  |   |
| 8,12 | Kg of hazardous substances used and transformed at the time of disposal in toxic elements   | 0  |   |
| 8,13 | No of accidental spills of special chemicals  | ND |   |
| 8,14 | Program activities that reuse metal, plastic and rubber waste.  | 0  | None  |
| 8,15 | Names of specialized companies authorized to eliminate waste oil and grease   | 0  | Dyncorp   |
| 8,16 | Names of used substances or products that contain asbestos, chlorates, lithium batteries, PCBs and mercury  | 0  |   |

|   |      |                                |          |
|---|------|--------------------------------|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN  | Page 5/5 |
|   | RF3  | Solid Waste Management Program | Sheet 3  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |

|      |  |   |                                 |
|------|--|---|---------------------------------|
| 8,17 | Names of contractors responsible for control, handling and conditioning of areas affected by accidental spills of special chemicals. |   | Activities of DIRAN and DYNCORP |
| 8,18 | Last time returned to supplier of hazardous substances   |   | DD/MM/YY                        |
| 8,19 | Names of hazardous substances used and transformed at the time of disposal in toxic elements.  | 0 |                                 |

Note: Herbicide containers are used to build barricades and defences of the Operations Base.

#### 9 MANAGEMENT PLAN FOR SOLID WASTE LINKED TO THE HANDLING OF GLYPHOSATE (REG)

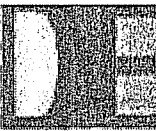
|     | Description  | Qty | Comments   |
|-----|--|-----|--|
| 9,1 | No of containers of glyphosate, surfactants and other products added into the formulation used as receptacles for waste after washing with water | 4   |  |
| 9,2 | M2 occupied by REG in the compartment of the stores used for temporary disposal of recyclable waste  | 20  | Channels to one side of the airport platform insulated from the groups by wooden props |
| 9,3 | Litres of water used in washing receptacles at the base for reuse in aircraft tanks  | 0   | It is recommended that simple processes be designed for mobile bases                   |
| 9,4 | No of containers sold or given away to local inhabitants   | 0   |  |
| 9,5 | Last time the glyphosate distributor (Monsanto) collected and removed containers to special deposits.  | ND  | DD/MM/YY   |

#### 10 FOLLOW-UP AND MONITORING

|      |   |  |  |
|------|---|--|--|
| 10,1 | Name and post of person effecting daily inspections of the temporary waste storage area (Attach reports or copies of notebooks) |  | The mixer is responsible for inspections. Patrolman Omar Hernández |
| 10,2 | Name and post of person making inspections of Base installations to verify compliance with activities (attach reports)          |  | Base CO  |
| 10,3 | Name and post of the person making weekly follow-up of the recovery and recycling program.                                      |  | Patrolman Omar Hernández   |

COMMENTS



|  |      |   |          |
|--|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 1/6 |
|  | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE         |  |
|--------------|----------------|----------|-----|------|--------------|------|--------------|--|
| Professional | Name           |          |     |      | Professional | Name | Apiay mobile |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec       |  |

Evaluation: 01/11/03 to 30/11/03

### DATA OF OPERATIONS BASE

|  |                                 |
|--|---------------------------------|
| 1 Name   | Apiay mobile Antinarcotics Base |
| 2 Location                                     | Apiay airport                   |
| Municipality                                   | Apiay                           |
| Department                                     | Meta                            |
| 3 Person responsible for environmental matters | Capt Miguel Tunjano             |

#### USE AND MANAGEMENT OF WATER

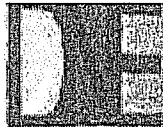
##### Supply

|   |                               |
|---|-------------------------------|
| The licence or permit to use water is valid until | ND                            |
| Used for processes and services                   | 1.41 cu.m./day<br>(processes) |

| Water source   | Cu m/month |                            |
|--|------------|----------------------------|
| Public supply  |            |                            |
| Well   |            |                            |
| Spring   |            |                            |
| Other (what)   | 19.77      | Obtained from fire brigade |
| Water consumption  |            |                            |
| Public supply  |            |                            |
| Well   |            |                            |
| Spring   |            |                            |
| Other (what)   | 19.77      | See above                  |
| Type of treatment given to water (at Base or in the municipal utility) |            | Filtration                 |
| Water is recycled from   |            |                            |
| Industrial use   | 0          |                            |
| Tank washing   | 0          |                            |
| Other  |            |                            |

#### ORIGIN AND PRODUCTION OF WASTEWATER

| Description  | YES/NO |
|--|--------|
| Is domestic wastewater generated by Base personnel during operation times?                                     | N      |
| Is there water from washing installations thnat passes into the rainwater network?                             | N      |
| Is there rainwater that goes into the collection system independently of sewage and evacuated out of the Base? | -      |
| Is there water from aircraft tank washing contaminated with glyphosate?  | Y      |
| General services currently available   |        |
| Generation of electricity  | Y      |
| Workshops-Garages  | N      |
|  |        |

|   |      |   |          |
|---|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 2/6 |
|   | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

|              |                |          |     |      |              |      |              |  |
|--------------|----------------|----------|-----|------|--------------|------|--------------|--|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE         |  |
| Professional | Name           |          |     |      | Professional | Name | Apiay mobile |  |
| Env. Audit   | Jairo E. Pérez |          |     |      |              |      | Consec       |  |

#### 4 CAUSES OF GENERATION OF DISCHARGES

|     |  |    |
|-----|--|----|
| 4,1 | Generation of secondary products   | 0  |
|     | Quantity of mixture badly prepared due to wrong measurements                       | 0  |
|     | Quantity of mixture badly prepared due to contamination of equipment with catalyts | 0  |
|     | Quantity of mixture badly prepared due to equipment malfunction                    | ND |
|     | Quantity of mixture spilled in emergencies   | 0  |

#### 4,2 Use of toxic materials

| Type           | Lts | Name |
|----------------|-----|------|
| Solvents       | ND  |      |
| Heavy metals   | 0   |      |
| Anticorrosives | ND  |      |
| Antifoam       | 0   |      |

#### 4,3 Accidental loss or deterioration of materials/products

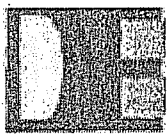
| Type                                      | Equipment  |
|---|--|
| Leaks into the soil                       | Might take place eventually at the herbicide mixing site |
| Evaporation of volatile organic compounds | N/A  |
| Other                                     |  |

#### 4,4 Points and flows of discharge

| Location | Flow (cu,m./hour) | Origin           | Received by |
|----------|-------------------|------------------|-------------|
| Platform | ND                | Aircraft washing | Soil        |
|          |                   |                  |             |
|          |                   |                  |             |

#### 4,5 Composition of drainage system at Base and contamination

| Description  | Y/N | Comments   |
|--|-----|--|
| Water free of oil and grease                                     |     |  |
| Rainwater with no oil, offices, stores                           | Y   |  |
| Accidentally contaminated water                                  |     |  |
| Rain or firefighting water not normally contaminated             | N   |  |
| Continually contaminated water                                   |     |  |
| Tank drainage, rain in mixing area, filling, etc                 | Y   | To be evaluated (rainwater captured on the platform might be contaminated) |
| Process water in contact with raw materials, storage, byproducts | N   |  |



MPMA

RF4

**ENVIRONMENTAL MANAGEMENT PLAN**

**Wastewater Management Program at PECIG Bases**

Page 3/6

Sheet 4

|              |                |          |     |      |              |      |              |
|--------------|----------------|----------|-----|------|--------------|------|--------------|
| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE         |
| Professional | Name           |          |     |      | Professional | Name | Apiay mobile |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec       |

|   |   |  |
|---|---|--|
| Water for hygiene uses similar to domestic use in cleaning offices, cafeterias, etc | Y |  |
|---|---|--|

4.6 Segregation of effluent

| Type  | Y/N | Comments  |
|---|-----|---|
| Sewage  | Y   | Airport administration is responsible   |
| Rainwater                                     | ND  | To be established. There are no drawings of the airport platform                                      |
| Water with oil/grease                         | ND  | Oils and greases potentially produced correspond to the movements of all aircraft using this terminal |
| Mixture production process water              | N   |   |
| Aircraft tank washing water                   | N   |   |
| Water contaminated with glyphosate or mixture | N   |   |

4.7 Characteristics of the rainwater system

| Description   | Y/N        | Condition | Comment                                   |
|---|------------|-----------|---|
| Contaminants are carried to soil or non-contaminated channels   | Eventually |           | Mixing and filling are closed systems     |
| The system collects rainwater from platform areas, gardens and sports facilities                            | ND         |           |   |
| The system collects rainwater from internal roads, roofs administration, hangars, trailers and parking area | ND         |           | Area separated from buildings and hangars |

ND No information available

5 TREATMENT OF WASTEWATER

5.1 Treatment of wastewater at the Base  
Name wells, springs or other water sources contaminated by the wastewater treatment system

There is no treatment plant

The gradient for the evacuation of effluent is

\_\_\_\_\_ %

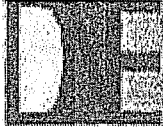
The wastewater treatment system is located at a distance from the Base of

The wastewater treatment system is close to the well \_\_\_ spring \_\_\_ or other source at a distance of

\_\_\_\_\_ metres

5.2 Class of effluent treated

| Effluent                                      | Cu.m/day | Comments                           |
|---|----------|------------------------------------|
| Sewage  | ND       | Mobile base: uses army base system |
| Rainwater                                     | -        |                                    |
| Water with oil/grease                         | 0        |                                    |
| Mixture production process water              | 0        |                                    |
| Aircraft tank washing water                   | 0        |                                    |
| Water contaminated with glyphosate or mixture | 0        |                                    |

|   |      |  |          |
|---|------|--|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT 'PLAN                 | Page 4/6 |
|   | RF4  | Wastewater ;Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |  |
|--------------|----------------|----------|-----|------|--------------|------|--------|--|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |  |
| Env Audit    | Jairo E. Pérez |          |     |      |              |      | Consec |  |

5,3 Base Purifying Plant (if any)  
 Plant type \_\_\_\_\_  
 Types of effluent treated \_\_\_\_\_  
 Available surface for plant \_\_\_\_\_  
 Treatment Capacity \_\_\_\_\_  
 Yield in Purification \_\_\_\_\_

5,4 Special Liquid Waste (SLW) This refers to liquids contaminated with glyphosate or prepared mixture. The treatment given is:

|   |   |
|---|---|
| Discharge into the public sewerage system | N |
| Biological system                         | N |
| Deep burial                               | N |
| Chemical deactivation                     | N |

Note: surplus herbicide mix is recycled \_\_\_\_\_

5,5 Domestic Liquid Waste (DLW)  
 Discharged direct into the public system Y  
 Is treatment applied to DLW? ND  
 Treatment is .... \_\_\_\_\_  
 Effluent parameters are \_\_\_\_\_  
 Maximum capacity of treatment system \_\_\_\_\_  
 Loads and main characteristics of the treatment system \_\_\_\_\_  
 DBO load \_\_\_\_\_ Kg/day  
 SS load \_\_\_\_\_ Kg/day  
 Average retention time \_\_\_\_\_ Hours  
 Maximum air flow \_\_\_\_\_ Cu.ft air/cu.m. day  
 Recirculation \_\_\_\_\_ %  
 DBO removal \_\_\_\_\_ %  
 SST removal \_\_\_\_\_ %  
 Maintenance as specified by builder \_\_\_\_\_  
 Latest maintenance date ND DDMMYY  
 Time of biological destabilization of the process and proliferation of unpleasant smells ND DDMMYY  
 Note: No DLW is generated in the mixing and filling area for herbicides and fuels.

6 STUDY OF DISCHARGES

6,1 Wastewater is discharged from the whole Base to:

|                         |   |                            |
|-------------------------|---|----------------------------|
| Watercourse             |   |                            |
| Public sewerage network | Y | Those generated by a spill |
| Septic tanks            |   |                            |
| Open ground             |   |                            |

6,2 Expiry of discharge permit \_\_\_\_\_  
 6,3 Latest verification of discharge quality ND

MPMA

ENVIRONMENTAL MANAGEMENT PLAN

Page 5/6

RF4

Wastewater management Program for PECIG Bases

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |

6,5 Physical-Chemical and microbiological analysis on each discharge

Attach laboratory results  
List of analysis results attached

| Discharge | Source | Date analyzed | Laboratory analyzing |
|-----------|--------|---------------|----------------------|
| 1         |        |               |                      |
| 2         |        |               |                      |

7 SLUDGE TREATMENT  
Complete only if there is treatment of wastewater

8 THE ENVIRONMENTAL SITUATION

8,1 Discharges into watercourses? N

Expiry date of discharge permit \_\_\_\_\_

Name of receiving watercourse \_\_\_\_\_

Basin \_\_\_\_\_

Flow (cu.m./hour) \_\_\_\_\_

Average Minimum \_\_\_\_\_

Uses of water outside the Base

|                             |          |                               |
|-----------------------------|----------|-------------------------------|
| Upstream                    |          |                               |
| Downstream                  |          |                               |
| Classification of discharge |          |                               |
| Description                 | Election | Comments                      |
| Contaminating               |          |                               |
| Non-contaminating           |          |                               |
| Potentially contaminating   |          |                               |
| Not evaluated               |          | To be clarified and evaluated |

8,2 Discharge into public sewerage network

Date of expiry of discharge permit DDMMYY

Capacity of Municipal purifier ND Cu.m./hour

Type of treatment given \_\_\_\_\_

Characteristics of municipal sewerage system \_\_\_\_\_

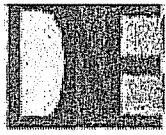
8,3 Discharge to septic tank N

Date of expiry of discharge permit DDMMYY

Capacity of tanks installed to serve the Plant \_\_\_\_\_ Cu.ft

Age \_\_\_\_\_ Months

Condition (good, acceptable, bad) \_\_\_\_\_

|   |      |   |          |
|---|------|---|----------|
|  | MPMA | ENVIRONMENTAL MANAGEMENT PLAN                 | Page 6/6 |
|   | RF4  | Wastewater Management Program for PECIG Bases | Sheet 4  |

| COMPLETION   |                | REVISION | No. | DATE | APPROVAL     |      | BASE   |
|--------------|----------------|----------|-----|------|--------------|------|--------|
| Professional | Name           |          |     |      | Professional | Name | Apiay  |
| Env. audit.  | Jairo E. Pérez |          |     |      |              |      | Consec |

Sludge cleaning period

(Annual, half yearly,  
quarterly, monthly, other)  
DDMMYY

Latest overflow date

\_\_\_\_\_

8,4 Other discharges existing in the area

\_\_\_\_\_

\_\_\_\_\_

8,5 Adverse effects of discharges

Possible contamination created by PECIG in mixing and filling

\_\_\_\_\_

9 FOLLOWUP AND MONITORING

9,1 Date of latest quarterly characterization of Basic sanitation parameters to text the effectiveness of the treatment system and compliance with regulations on discharges (attach the last two laboratory results)

N/A \_\_\_\_\_

COMMENTS

The Apiay mobile Base does not generate domestic liquid waste.



**Annex 41-D**

**AUDIT TO THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS. *REPORT ON ACTIVITIES, PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE.* AUDITED PERIOD: 5 NOVEMBER TO 4 DECEMBER 2004, 7 DECEMBER 2004**

*(Archives of the Colombian Foreign Ministry)*







**Ministry of the Interior and Justice**  
**NATIONAL NARCOTICS DIRECTORATE**  
**Special Administrative Unit**

**ACTIVITY REPORT**  
**PROGRAM FOR THE ERADICATION OF ILLICIT CROPS**  
**BY AERIAL SPRAYING WITH GLYPHOSATE**

**Period from November 5 to December 4, 2004**

**Environmental Audit for the eradication of illicit crops**  
**Bogota, D.C., December 7, 2004**

Bogotá, December 13, 2004

Dr  
MARIO GERMAN IGUARÁN-ARANA  
DIRECTOR  
National Narcotics Directorate.  
Bogotá.

[National Narcotics Directorate  
In reply please quote  
B-2004-83031  
Date 2004/12/13  
Time: 15.04.12  
Area: Regional Affairs/Eradication Dept

60000]

Subject: Contact 0013/04

Dear Dr Iguaran,

I attach the Activity Report of the Environmental Audit, for monitoring the Program for the Eradication of Illicit Crops by Aerial Spraying with the Herbicide Glyphosate.

This report contains activities between November 5 and December 4, 2004

Cordially,  
(signed)

JAIRO ERNESTO PEREZ

Environmental Auditor, Program for the Eradication of Illicit Crops

Attached: magnetic file

000001

## **INTRODUCTION**

This document is a report for the Environmental Audit for monitoring the activities of the Program for the Eradication of Illicit crops by Aerial Spraying the herbicide Glyphosate, during the period November 5 and December to December 4, 2004

### **CONTENTS**

1. AUDIT ON THE ENVIRONMENTAL SITUATION.
2. THIS AUDIT ON THE DEVELOPMENT OF PECIG PROGRAMS AND PROCEDURES.
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3. EVALUATION OF PECIG ACTIONS AND ENVIRONMENTAL CONTROL.
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5. RECOMMENDATIONS.
6. SUMMARY
7. ANNEXES (ENVIRONMENTAL MANAGEMENT PLAN FORMS).

000002

**ENVIRONMENTAL MONITORING.  
SITE No. 1**



**Key: PLANTAIN**

|                                |  |
|--------------------------------|--|
| <b>PHOTO No. 140</b>           | <b>MUNICIPALITY: Puerto Guzmán, Putumayo</b>       |
| <b>ROLL No.</b>                | <b>COORDINATES N 00° 55' 52.1" W 76° 20' 42.9"</b> |
| <b>DATE SPRAYED : Before</b>   |  |
| <b>DATE VERIFIED: 20/11/04</b> | <b>DAYS ELAPSED</b>                                |

**OBSERVATIONS:**

- ❖ DIRAN and ICA officers taking soil samples to comply with activities in EMP Sheet 5.
- ❖ Life zone: very humid tropical forest.
- ❖ Average height of plants: 1.70 m Distance between them 0.80-0.90 m
- ❖ Adjoining the plot monitor monitored other plots were observed to be planted with coca-leaf.

**VERIFICATION OF LEGAL CROPS.**

- ❖ There were plantain plants mixed in among the coca leaf-plantation.

|  |                      |
|--|----------------------|
| <b>No. OF CONSTRUCTIONS ON PLOT</b><br>0 | <b>AFFECTED</b><br>- |
|--|----------------------|

000005

**ENVIRONMENTAL MONITORING.  
SITE No. 1**



Key: WATER SAMPLE COLLECTION SITE

|                         |   |
|-------------------------|---|
| PHOTO No. 138           | MUNICIPALITY: Puerto Guzmán, Putumayo       |
| ROLL No.                | COORDINATES N 00° 55' 52.1" W 76° 20' 42.9" |
| DATE SPRAYED : Before   |   |
| DATE VERIFIED: 20/11/04 | DAYS ELAPSED                                |

**OBSERVATIONS:**

- ❖ Water samples taken prior to spray aerial spray of activities with the herbicide deficit (1.40 5 PM)
- ❖ Drainage of water slow, apparently seasonal. Ambient temperature 24-28°C.
- ❖ Drainage protected by trees and shrubs. Rainfall 3000-5000 mm/year.

**VERIFICATION OF LEGAL CROPS.**

Plantain plants are in seem to be mixed with the coca-leaf.

|  |                      |
|--|----------------------|
| <b>No. OF CONSTRUCTIONS ON PLOT</b><br>1 | <b>AFFECTED</b><br>- |
|--|----------------------|

000006

**ENVIRONMENTAL MONITORING.  
SITE No. 2**



Key : SOIL SAMPLE COLLECTION SITE

|                         |   |
|-------------------------|---|
| PHOTO No. 149           | MUNICIPALITY: Puerto Guzmán, Putumayo       |
| ROLL No.                | COORDINATES N 00° 57' 25.8" W 76° 21' 30.5" |
| DATE SPRAYED : Before   |   |
| DATE VERIFIED: 20/11/04 | DAYS ELAPSED                                |

**OBSERVATIONS**

- ❖ General view of the leaf plantation, where soil samples were taken prior to spray activities.
- ❖ The landscape is formed by rolling sedimentary plane. Fragmented basal agricultural ecosystem.
- ❖ Lithology: Clay and unconsolidated sound sediment.

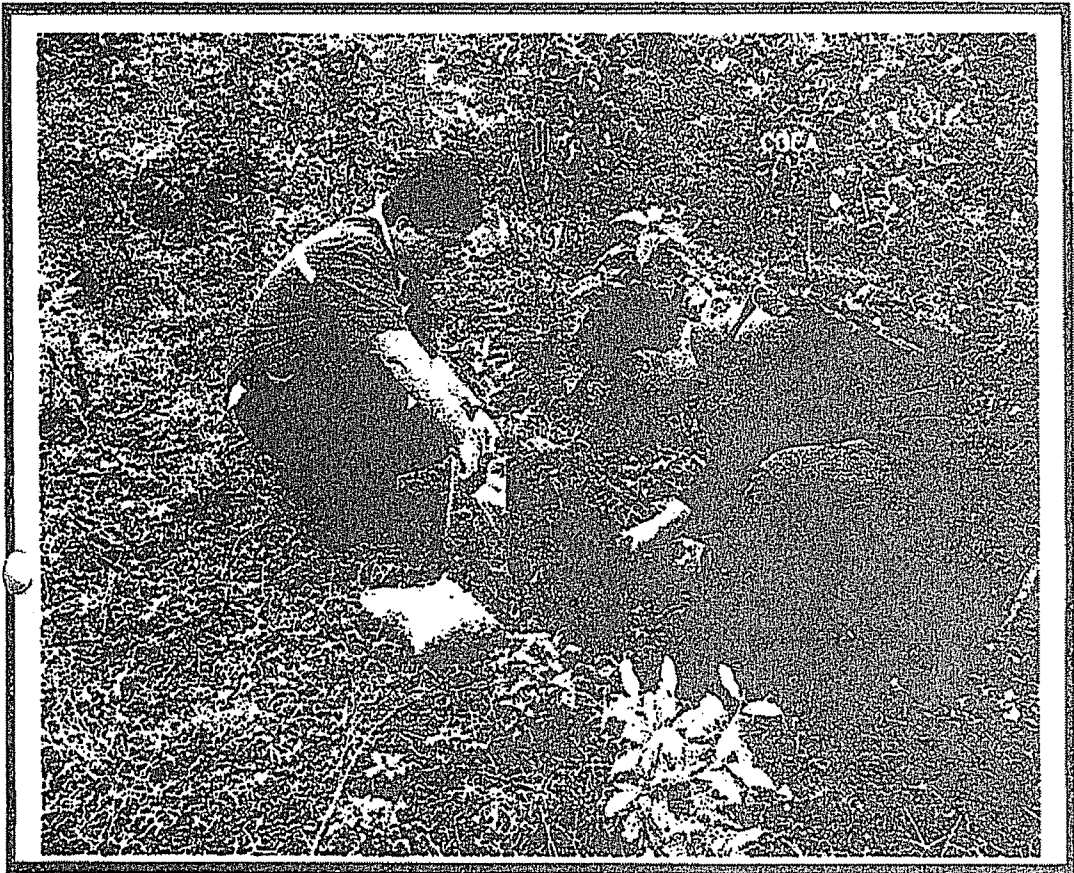
**VERIFICATION OF LEGAL CROPS.**

- ❖ No legal crops were observed in the on this plot.

|                                   |               |
|-----------------------------------|---------------|
| No. OF CONSTRUCTIONS ON PLOT<br>0 | AFFECTED<br>- |
|-----------------------------------|---------------|

000007

**ENVIRONMENTAL MONITORING  
SITE No. 3**



Key: COCA-LEAF

|                         |  |
|-------------------------|--|
| PHOTO no. 153           | MUNICIPALITY: Puerto Guzmán, Putumayo      |
| ROLL No.                | COORDINATES N 00° 57'27.3" W 76° 21' 30.3" |
| DATE SPRAYED : Before   |  |
| DATE VERIFIED: 20/11/04 | DAYS ELAPSED                               |

**OBSERVATIONS.**

- ❖ Alluvial soils of Andean origin (source: National Narcotics Department geo-referenced information system for Putumayo)
- ❖ Geology: Hillside deposits, alluvial fans, mudflows.
- ❖ Old coca- plants were observed, alternating with young plants (renewal of the coca crop)

**VERIFICATION OF LEGAL CROPS.**

- ❖ Plantain plants were observed to be interspersed the coca crop.

|  |                      |
|--|----------------------|
| <b>No. OF CONSTRUCTIONS ON PLOT</b><br>0 | <b>AFFECTED</b><br>- |
|--|----------------------|

000008



**ENVIRONMENTAL MONITORING  
SITE No. 1.**



Key: PLOT OF COCA-LEAF SPRAYED

|                                      |   |
|--------------------------------------|---|
| PHOTO No. 40906                      | MUNICIPALITY: Puerto Guzmán, Putumayo       |
| ROLL No.                             | COORDINATES N 00° 55' 52.1" W 76° 20' 42.9" |
| DATE SPRAYED : 27/11/04 and 28/10/04 |   |
| DATE VERIFIED: 27/11/04              | DAYS ELAPSED 1 and 30                       |

**OBSERVATIONS**

- ❖ Sector where the second compound sample of soil was taken. Coca-leaf crop sprayed 60 days before, showing necrosis and defoliation.
- ❖ Officers of ICA and the Antinarcotics Police can be seen taking soil samples.

**VERIFICATION OF LEGAL CROPS.**

- ❖ Plantain plants were observed to be interspersed with the coca leaf crop.

|  |                      |
|--|----------------------|
| <b>No. OF CONSTRUCTIONS ON PLOT</b><br>1 | <b>AFFECTED</b><br>- |
|--|----------------------|

000009

**ENVIRONMENTAL MONITORING  
SITE No. 2**



**Key: WATER SAMPLE COLLECTION SITE**

|                                |  |
|--------------------------------|--|
| <b>PHOTO No. 156</b>           | <b>MUNICIPALITY: Puerto Guzmán, Putumayo</b>       |
| <b>ROLL No.</b>                | <b>COORDINATES N 00° 57' 25.8" W 76° 21' 30.5"</b> |
| <b>DATE SPRAYED : 27/11/04</b> |  |
| <b>DATE VERIFIED: 27/11/04</b> | <b>DAYS ELAPSED 1</b>                              |

**OBSERVATIONS:**

- ❖ After the first water sample taking was taken (seven days before), drainage can be seen to be diminished inflow (seasonal drainage).
- ❖ Ecologically, this is a very humid tropical forest area, which has been strongly intervened by illicit coca leaf crops, and settler fronts.

**VERIFICATION OF LEGAL CROPS.**

- ❖ Plantain plants were observed to be interspersed with the coca leaf with the illicit coca leaf crop.

|  |                      |
|--|----------------------|
| <b>No. OF CONSTRUCTIONS ON PLOT</b><br>0 | <b>AFFECTED</b><br>- |
|--|----------------------|

000010

**ENVIRONMENTAL MONITORING  
SITE No. 3**



|                         |   |
|-------------------------|---|
| PHOTO No. 918           | MUNICIPALITY: Puerto Guzmán, Putumayo       |
| ROLL No.                | COORDINATES N 00° 57' 27.3" W 76° 21' 30.3" |
| DATE SPRAYED : 27/11/04 |   |
| DATE VERIFIED: 27/11/04 | DAYS ELAPSED                                |

**OBSERVATIONS:**

- ❖ Soil samples were taken hours after aerial spraying with glyphosate herbicide.
- ❖ Soil samples were sent to IGAC for physical and chemical analysis, and determination of the herbicide glyphosate will be made in a laboratory abroad.

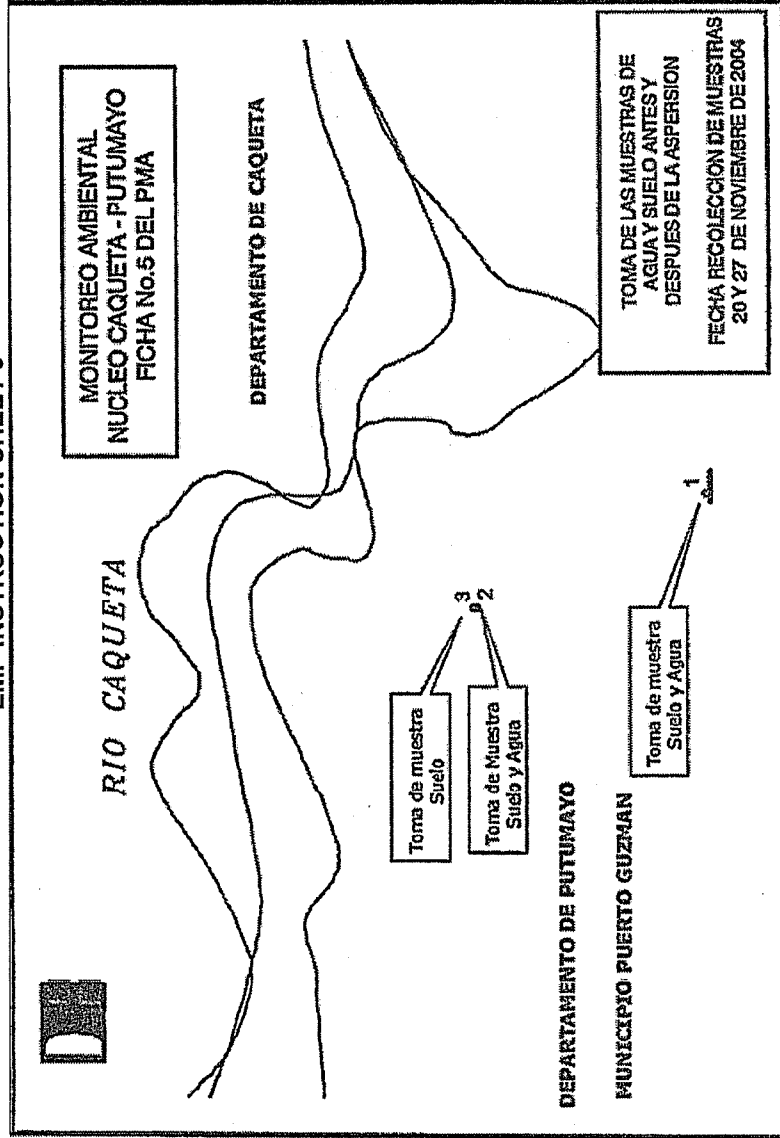
**VERIFICATION OF LAWFUL LEGAL CROPS.**

- ❖ Plantain plants were observed to be interspersed with the coca leaf crop.

|                                   |               |
|-----------------------------------|---------------|
| No. OF CONSTRUCTIONS ON PLOT<br>0 | AFFECTED<br>- |
|-----------------------------------|---------------|

000011

ENVIRONMENTAL MONITORING – CAQUETÁ-PUTUMAYO NUCLEUS  
EMP INSTRUCTION SHEET 5



000012

Key:

- Toma de muestra suelo Soil simple taken
- Toma de muestra suelo y agua Soil and water samples taken
- Toma de las muestras de agua y suelo antes y después de la aspersión Water and soil samples taken before and after spraying
- Fecha de recolección de muestras de 26 y 27 de noviembre de 2004 Samples collected on November 20 and 27, 2004

## **2. AUDIT RELATED TO THE DEVELOPMENT OF PECIG PROGRAMS AND PROCEDURES**

Based on the development of forms designed to track the various Environmental Management Plan (EMP) activities, the Audit has the following comments:

### **San José del Guaviare and Larandia Operating Bases, Villa Garzón and Neiva Mobiles**

#### **Evaluation of the Management Program of the Spraying Operations**

- It is important for the DIRAN to quickly have the records of spraying missions available, in order to evaluate the spraying activities for the period audited.
- On November 30, 2004, officials of DIRAN, NAS, Dyncorp, and PECIG Audit met in order to proceed with the work of coordination and planning of the verification operations of the sprayed areas under coca cultivation in 2004. In order to calculate the amount of points to verify, the decision was to select two sites per thousand hectares sprayed, with the purpose of evaluating the effectiveness of applications, and one site for every thousand hectares to verify the effects on the environment. Each site must contain a line of spray no less than 25 meters long (0.12 ha). Additionally, 40 points were involved, which correspond to areas where there were discharges of the mixture and places where soil samples were collected (Putumayo and Guaviare) in the last international verification.
- Inventories of Glyphosate herbicide were verified in the Operating Bases of San José del Guaviare, Larandia and Villa Garzón.

#### **Evaluation of the Industrial Security Program in the Operating Bases**

- In the Larandia Base, the storage containers of the glyphosate herbicide were changed since the previous ones were damaged. Repairs were also made to the mixing equipment and the number of hoses were reduced; this in order to reduce leakage and damage to them.

000013

- It was noted that the use of all industrial safety elements is not permanent. The respiratory protection is the industrial safety element mixers avoid the most, due to exposure to high ambient temperatures which can exceed 30° C (San José del Guaviare Base).
- In one of the heliports there was a fuel gauge without the adequate support. (SJG Base).
- Appendix No 6 - Chapter 4 presents the clinical laboratory tests, performed on 4 DIRAN officials who handle agrochemicals (Mixers).

With regard to the clinical analysis, the parameters examined were within normal values and there was no evidence of toxic activity.

#### **Evaluation of the Solid Waste Management Program**

- In Larandia, San José del Guaviare and Villa Garzón Bases there are plenty of empty agrochemical containers, which must be removed from the operating bases by the supply companies for their disposal.

#### **Evaluation of the Wastewater Management Program in the PECIG Bases**

- To prevent the overflow of the Industrial wastewater re-user plant (contaminated with glyphosate) a storage tank with a capacity of 4,000 liters in the mixing zone was added. (SJG Base).
- Appendix No. 5 - Chapter 4 presents the record of the herbicide bin washing performed in the Neiva Mobile Base.

#### **Evaluation of the Environmental Monitoring Program**

- 
- On November 20 and 27, 2004 environmental monitoring activities were developed in the Caquetá – Putumayo nuclei. Composite soil samples were collected on three plots with coca leaf, before and after aerial spraying with the herbicide glyphosate.

Soil samples were sent to IGAC for analysis, and water samples were sent to ICALANIA.

**Evaluation of the Communications and Social Management Program.**

- In November 2004, DIRAN reported 94 complaints, and 172 complaints were processed.

The table below shows the statistics of complaints received and processed in DIRAN, depending on their place of origin.

| DEPARTMENT   | MUNICIPALITY          | No. of complaints received |
|--------------|-----------------------|----------------------------|
| ARAUCA       | Tame                  | 3                          |
| BOLÍVAR      | Santa Rosa del sur    | 27                         |
| CAQUETÁ      | Belén Andaquíes       | 6                          |
|              | Puerto Rico           | 2                          |
|              | El Doncello           | 2                          |
|              | San José de la Fragua | 2                          |
|              | La Montañita          | 4                          |
| GUAJIRA      | Dibulla               | 46                         |
| GUAVIARE     | Miraflores            | 1                          |
|              | San José del Guaviare | 1                          |
| <b>TOTAL</b> |                       | <b>94</b>                  |

Source: Antinarcotics Police.

| DEPARTMENT   | MUNICIPALITIES         | No of complaints processed |
|--------------|------------------------|----------------------------|
| ARAUCA       | Fortul                 | 37                         |
| CAQUETÁ      | San Vicente del Caguán | 1                          |
| GUAVIARE     | San José del Guaviare  | 1                          |
| NARIÑO       | Barbacoas              | 80                         |
|              | La Unión               | 17                         |
|              | Tumaco                 | 27                         |
| PUTUMAYO     | Orito                  | 5                          |
| SANTANDER    | Barrancabermeja        | 1                          |
|              | Cimitarra              | 1                          |
| VICHADA      | Cumaribo               | 2                          |
| <b>TOTAL</b> |                        | <b>172</b>                 |

Source: Antinarcotics Police

- In this period, no compensation was paid for damage caused by PECIG.
- During November 19-27, 2004, activities took place to verify complaints in the Department of Putumayo, visiting municipalities of Villa Garzón, Puerto Guzmán, Puerto Caicedo, Puerto Asis and Orito. Visits to San Miguel and Valle del Guamuez remained pending.
- The National Narcotics Directorate updated the webpage, placing the document "Current situation of illicit coca leaf and opium poppy crops in the Department of Cauca" on it.
- The DIRAN officers attended a course given by ICA and Syngenta on the subject "appropriate and effective use of products for the protection of crops, and techniques of ground-based application", given in the municipality of Codazzi (Cesar), on November 3, 2004 (see Annex 7, Chapter 4).
- OAS officers visited the San Jose de Guaviare operations base, and made comments on the herbicide storage area, the fuel storage and chemicals mixing area.

000016



An overflight was made of some areas with coca-leaf crops in the Departments of Meta and Guaviare.

#### **Evaluation of the Public Health Program**

- The health authority INS engaged in an active search for cases of those possibly affected by the herbicide glyphosate in the Department of Putumayo, and for this purpose took 27 samples of blood and urine. Further, a training course was given to officers of the regional health services of the Department of Boyacá. The course was given at the request of the Department Governor.

#### **Evaluation of the Contingency Plan.**

- Annex 4-Chapter 4 includes the note of record containing the contingency plan for the San Jose de Guaviare base, by DIRAN.
- Two environmental-type contingencies took occurred (discharges of mixture), in the Departments of Guaviare and Caquetá. These contingencies were not attended to, given to difficult conditions of public order.

The following the incidents occurred according to information contained in the Antinarcotics Police reports.

#### **Meta-Guaviare Nucleus**

- On November 8, 2004, the aircraft PNC3050 was hit at 02°48.54N, 72° 54.66" W, in the Municipality of Puerto Rico (Meta). 101 gallons of mixture were discharged into the coca-leaf crop.

#### **Caquetá-Putumayo Nucleus**

- On November 4, 2004, the aircraft AT802 PNC4007 was hit. The mixture was not discharged.
- On November 10, 2004, the aircraft T65-PNC270 was hit on the left window, at 00° 46.96"N, 76° 46.27" W, in the Municipality of Orito. The mixture was not discharged.

- On November 12, 2004, at 00° 51.75"N -76° 51.06" W, in the Municipality of Orito, an explosive device was detonated when the T65 aircraft and escort helicopters passed over. No damage was done to the aircraft.
- On November 30, 2004 PNC 4007 discharged 92 gallons of glyphosate at an altitude of 3500 ft, at 01°23.54"N and 71° 20.88" W, in the Municipality of Montañita. No measurements were taken afterwards, due to harassment in the area.

Annex 8 contains the forms containing information on the basis for evaluating the environmental performance of PCI G and the progress of implementation and development of the environmental management plan.

Further, there are reports from the Audit Assistants Ramiro Andres Rincon-Tellez and Oscar Vallejo, who were engaged in follow-up activities at the Antinarcotics Bases of San Jose del Guaviare and Larandia (Capita). See Annexes 9 and 10.

The engineer Ramiro Andres Rincon stayed at the San Jose del Guaviare base between on November 3-17 and at Larandia on November 23-30, , and the Engineer Oscar Vallejo spent November 4-17 Larandia, and November 24-30, 2004 at San José del Guaviare. The records of their stays there are attached to the report, presented by each of them, under Contracts 034 and 033 respectively.

**000018**

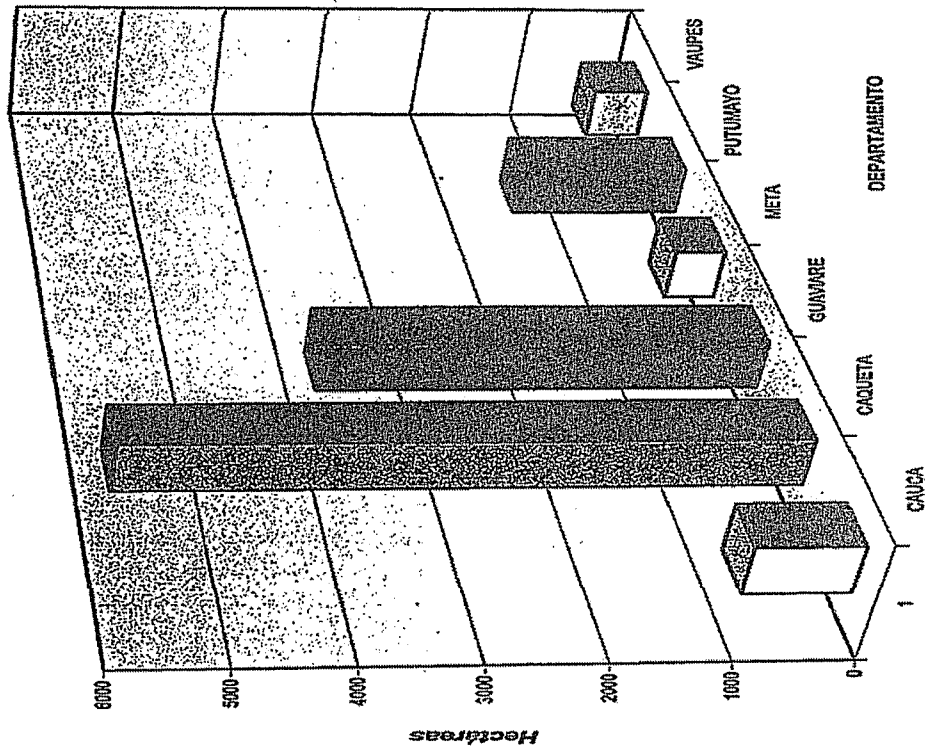
**SUMMARY OF AERIAL SPRAYING OF ILLICIT COCA-LEAF CROPS BY DEPARTMENT AND MUNICIPALITY.  
NOVEMBER 1-30, 2004.**

| <b>DEPARTMENT</b>      | <b>MUNICIPALITY</b>   | <b>AREA (ha)</b> |
|------------------------|-----------------------|------------------|
| <b>CAQUETÁ</b>         | Albania               | 257.40           |
|                        | Cartagena del Chaira  | 615.16           |
|                        | Florencia             | 160.01           |
|                        | Montañita             | 1078.02          |
|                        | Milán                 | 193.76           |
|                        | Paujil                | 263.98           |
|                        | Puerto Rico           | 1213.04          |
|                        | Solano                | 234.99           |
|                        | Solita                | 369.76           |
|                        | San José de La Fragua | 771.84           |
| San Vicente del Caguán | 25.77                 |                  |
|                        | Valparaíso            | 598.62           |
| <b>CAUCA</b>           | Piamonte              | 671.54           |
|                        | Santa Rosa            | 227.17           |
| <b>GUAVIARE</b>        | Calamar               | 854.59           |
|                        | El Retorno            | 1128.28          |
|                        | Miraflores            | 1078.10          |
|                        | San José del Guaviare | 804.16           |
| <b>META</b>            | Mapiripán             | 404.06           |
|                        | Puerto Concordia      | 19.87            |
|                        | Puerto Rico           | 21.32            |
| <b>PUTUMAYO</b>        | Mocóa                 | 96.58            |
|                        | Orito                 | 545.01           |
|                        | Puerto Guzmán         | 191.92           |
|                        | Puerto Asís           | 80.95            |
|                        | Puerto Caicedo        | 355.51           |
|                        | Villa Garzón          | 276.49           |
| <b>VAUPES</b>          | Carurú                | 524.06           |
| <b>TOTAL PERIODO</b>   |                       | <b>13.061,96</b> |

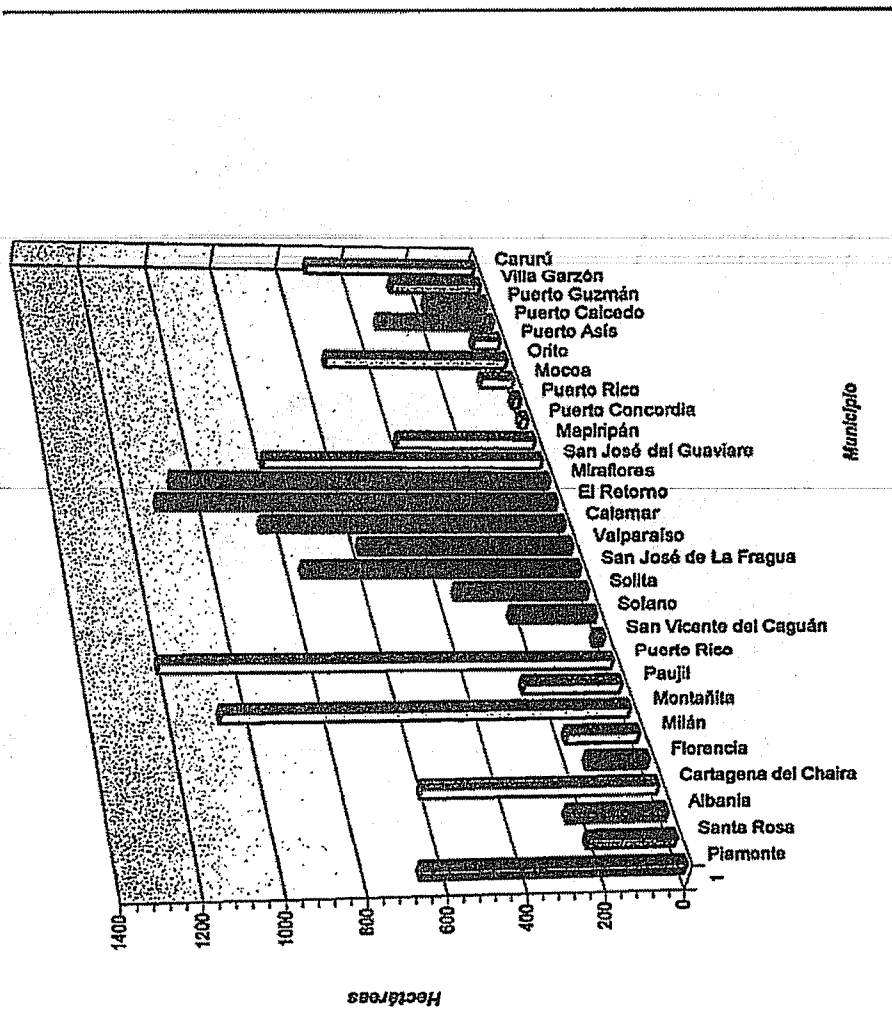
Data for November 1-30, 2004, DIRAN Polygrams

000020

GRAPH 1  
AERIAL SPRAYING OF ILLICIT COCA-LEAF CROPS BY DEPARTMENTS  
NOVEMBER 1-30, 2004



GRAPH 2  
 AERIAL SPRAYING OF ILLICIT COCA-LEAF CROPS BY MUNICIPALITIES  
 NOVEMBER 1-30, 2004



## 2.1. SUMMARY OF SPRAYING ACTIVITIES.

The Chart below shows the area covered by illicit coca leaf and opium poppy crops, which were sprayed in the period November 1-30, 2004. Graphs 1, 2, 3 and 4 show statistics by Department and Municipality for illicit coca leaf and opium poppy crops sprayed.

Tables 1 and 2 show the monthly accumulated figure by Department and Municipality of the areas sprayed for coca leaf and opium poppy, respectively.

Annex 1-Chapter 4 contains Maps 1, 2, 3, 4 and 5, which show the areas which were the targets of PECIG in October 2004 (maps for November are not presented, since the spraying records are still not available in DIRAN).

Aerial spraying records with the herbicide glyphosate for illegal coca-leaf and opium-poppy crops, conducted from the bases at San Jose del Guaviare (Guaviare), Larandia (Caquetá) and mobile bases at Tame (Arauca), Neiva (Huila) and Valledupar (Cesar), appear in Annex 2-Chapter 4. It is clarified that the records are for the period October 1-31, 2004.

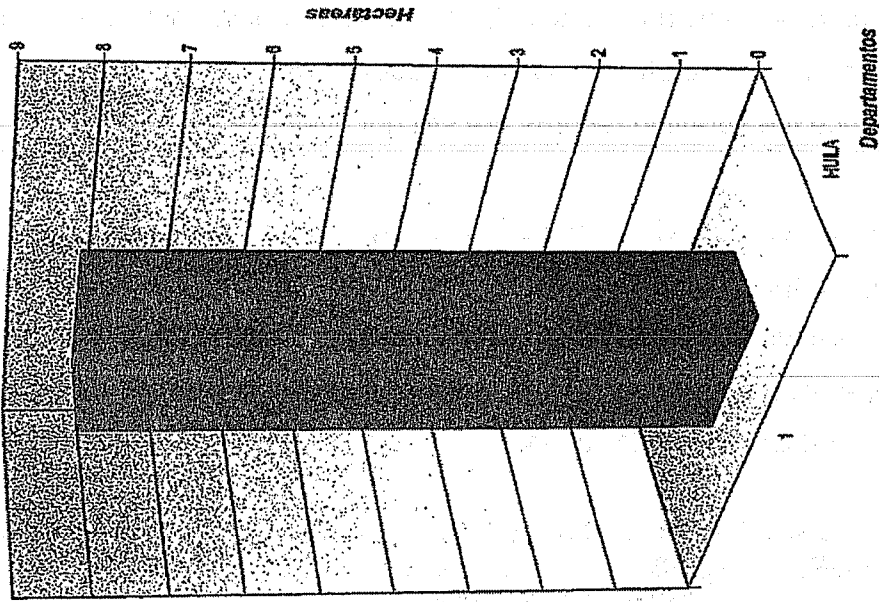
### SUMMARY CHART FOR AERIAL SPRAYING OF ILLICIT OPIUM OF OPIUM POPPY CROPS BY DEPARTMENT AND MUNICIPALITY. PERIOD NOVEMBER 1-30, 2004

| DEPARTMENT | MUNICIPALITY         | AREA (ha) |
|------------|----------------------|-----------|
| HUILA      | COLOMBIA             | 8.21      |
|            | Total for the period | 8.21      |

Data for November 1-30, 2004. From DIRAM polygrams

000019

GRAPH 3  
AERIAL SPRAYING OF ILLICIT OPIUM-POPPY CROPS BY DEPARTMENT  
NOVEMBER 1-30, 2004



GRAPH NO. 4  
AERIAL SPRAYING OF ILLICIT OPIUM-POPPY CROPS BY MUNICIPALITY  
NOVEMBER 1-30, 2004

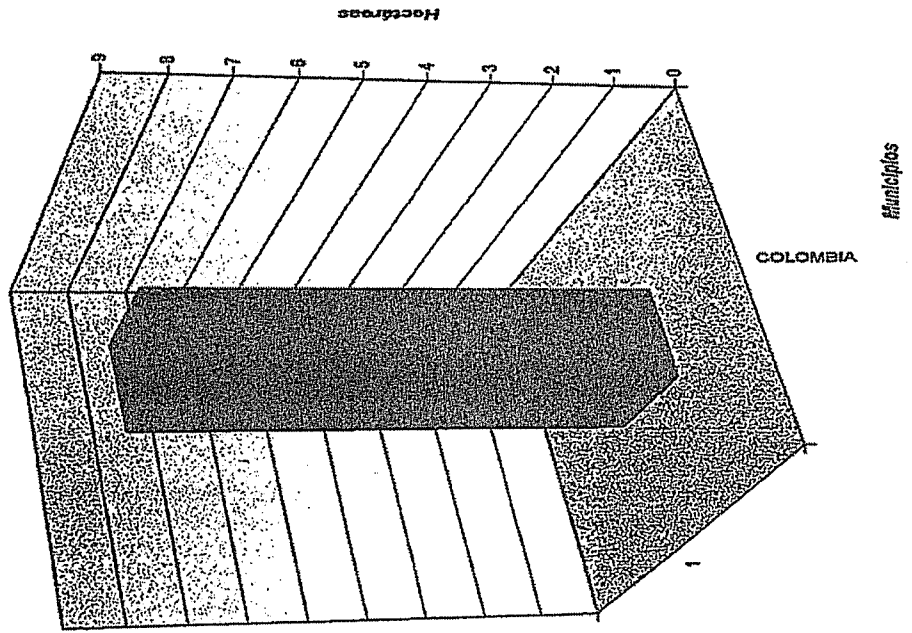




TABLE No. 1  
 TOTAL SPRAYED AREA FOR ILLICIT COCA-LEAF CROPS  
 PERIOD JANUARY - NOVEMBER 2004

| Department   | Municipality | Total sprayed area  | JAN    | FEB    | MAR    | APR    | MAY    | JUN    | JUL    | AUG    | SEP    | OCT    | NOV    | DEC    |
|--------------|--------------|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| DEPARTAMENTO |              | TOTAL AREA ASPIRADA |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              | (Ha)                |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              | 224.1               | 240.14 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 127.19              | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 | 127.19 |
|              |              | 40.38               | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  | 40.38  |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              |              | 372.78              | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 | 372.78 |
|              | ANTIOQUIA    |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
| ARAUCA       |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
| BOYACA       |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
| CALDAS       |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
| CAUCA        |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
| CUNDINAMARCA |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |
|              |              |                     |        |        |        |        |        |        |        |        |        |        |        |        |

000025

| DEPARTAMENTO | EMPRESA        | TOTAL AREA ASPERLUANA (m2) | ENERGIA (mwh) | FEBRERO (mwh) | MARZO (mwh) | ABRIL (mwh) | MAYO (mwh) | JUNIO (mwh) | JULIO (mwh) | AGOSTO (mwh) | SEPTIEMBRE (mwh) | OCTUBRE (mwh) | NOVIEMBRE (mwh) | DICIEMBRE (mwh) |
|--------------|----------------|----------------------------|---------------|---------------|-------------|-------------|------------|-------------|-------------|--------------|------------------|---------------|-----------------|-----------------|
| CORDOBA      | Empresa Comuna | 177.60                     | 0.00          | 177.60        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 117.60                     | 0.00          | 117.60        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 278.17                     | 1.00          | 278.17        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 811.25                     | 3.00          | 811.25        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
| QUINDIA      | Empresa Comuna | 2143.31                    | 0.00          | 2143.31       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 787.54                     | 0.00          | 787.54        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 387.63                     | 0.00          | 387.63        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 112.69                     | 0.00          | 112.69        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
| NARIÑO       | Empresa Comuna | 644.51                     | 0.00          | 644.51        | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 2112.60                    | 0.00          | 2112.60       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
| SANTANDER    | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |
|              | Empresa Comuna | 1871.30                    | 0.00          | 1871.30       | 0.00        | 0.00        | 0.00       | 0.00        | 0.00        | 0.00         | 0.00             | 0.00          | 0.00            | 0.00            |

3 2 0 0 0 0

| DEPARTAMENTO | SUBCRIPTO             | TOTAL AREA<br>APROXIMADA<br>(Ha) | ENERO<br>(Ha) | FEBRERO<br>(Ha) | MARZO<br>(Ha) | ABRIL<br>(Ha) | MAYO<br>(Ha) | JUNIO<br>(Ha) | JULIO<br>(Ha) | AGOSTO<br>(Ha) | SEPTIEMBRE<br>(Ha) | OCTUBRE<br>(Ha) | NOVIEMBRE<br>(Ha) | DICIEMBRE<br>(Ha) |
|--------------|-----------------------|----------------------------------|---------------|-----------------|---------------|---------------|--------------|---------------|---------------|----------------|--------------------|-----------------|-------------------|-------------------|
| VERACRUZ     | Cerezo                | 60.77                            |               |                 |               |               |              |               |               |                |                    |                 |                   |                   |
|              | Al. Puntagorda        | 52.41                            |               |                 |               |               |              |               |               |                |                    |                 |                   |                   |
|              | Al. S. J. de los Rios | 52.41                            |               |                 |               |               |              |               |               |                |                    |                 |                   |                   |
| VAJUPUE      | Cerezo                | 11.75                            |               |                 |               |               |              |               |               |                |                    |                 |                   |                   |
|              | Al. S. J. de los Rios | 11.75                            |               |                 |               |               |              |               |               |                |                    |                 |                   |                   |
| TOTAL        |                       | 127.401                          | 19,729.63     | 32,690.29       | 41,849.82     | 41,177.61     | 40,697.84    | 4,208.17      | 42,934.67     | 43,430.81      | 43,827.81          | 43,881.53       | 41.50             |                   |

Updated to November 30, 2004  
Sources: Spraying records, DIRAN polygrams  
October figures corrected based on spraying records

TABLE 2  
TOTAL AREAS SPRAYED FOR ILLICIT OPIUM-POPPY CROPS  
JANUARY-NOVEMBER N2004

| DEPARTAMENTO | MUNICIPIO      | TOTAL AREA<br>ASPRAYED<br>(ha) | ENERO<br>(ha) | FEBRERO<br>(ha) | MARZO<br>(ha) | ABRIL<br>(ha) | MAYO<br>(ha) | JUNIO<br>(ha) | JULIO<br>(ha) | AGOSTO<br>(ha) | SEPTIEMBRE<br>(ha) | OCTUBRE<br>(ha) | NOVIEMBRE<br>(ha) | TOTAL |      |
|--------------|----------------|--------------------------------|---------------|-----------------|---------------|---------------|--------------|---------------|---------------|----------------|--------------------|-----------------|-------------------|-------|------|
|              |                |                                |               |                 |               |               |              |               |               |                |                    |                 |                   | (ha)  | (ha) |
| HUILA        | Ayacucho       | 419.26                         | 44.84         |                 | 817           | 1.85          | 23.95        |               | 18.84         |                |                    | 0.63            |                   |       |      |
|              | Baños          | 17.19                          |               |                 | 1.85          |               |              |               |               |                |                    | 17.05           | 0.21              |       |      |
|              | Colombes       | 174.28                         |               |                 | 20.47         |               |              |               | 69.05         |                |                    |                 |                   |       |      |
|              | Cerrodepatate  | 111.77                         | 9.55          |                 | 33.03         |               |              |               | 32.45         |                |                    | 12.79           |                   |       |      |
|              | Quina          | 178.53                         | 6.53          |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | Robinson       | 14.00                          | 19.09         |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | Yumbá          | 23.81                          | 15.14         |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | Rivera         | 86.81                          | 21.02         |                 | 0.31          |               |              |               |               |                |                    |                 |                   |       |      |
|              | San Mateo      | 319.16                         | 25.55         |                 | 25.51         | 105.75        |              |               | 85.93         | 72.05          |                    |                 |                   |       |      |
|              | Tocaní         | 67.33                          |               |                 | 34.29         |               |              |               | 20.00         | 4.03           |                    |                 | 12.00             |       |      |
| CAUCA        | Tadó           | 27.88                          | 23.09         |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | Subtotal       | 1110.03                        | 155.38        | 0.60            | 0.60          | 194.70        | 371.58       | 0.29          | 232.23        | 252.60         | 0.60               | 87.23           | 0.21              | 0.60  |      |
|              | Alonso         | 22.90                          |               |                 |               | 12.07         | 14.22        |               |               |                |                    |                 |                   |       |      |
|              | Buen           | 115.10                         | 69.89         |                 |               | 27.15         |              |               |               |                |                    |                 |                   |       |      |
|              | San            | 18.20                          |               |                 |               |               | 15.20        |               |               |                |                    |                 |                   |       |      |
|              | Socotá         | 31.37                          |               |                 |               | 31.17         |              |               |               |                |                    |                 |                   |       |      |
|              | La Sierra      | 25.49                          |               |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | La Mesa        | 64.79                          |               |                 |               | 24.79         |              |               | 15.00         |                |                    |                 |                   |       |      |
|              | Pajar Buitrago | 45.58                          |               |                 |               | 0.51          |              |               |               |                |                    |                 |                   |       |      |
|              | Rosari         | 2.33                           |               |                 |               |               | 5.53         |               |               |                |                    |                 |                   |       |      |
| CESAR        | San Sebastián  | 48.89                          |               |                 |               | 30.59         |              |               |               |                |                    |                 |                   |       |      |
|              | Subtotal       | 432.40                         | 20.58         | 72.86           | 0.60          | 148.53        | 61.53        | 0.20          | 49.42         | 0.00           | 0.00               | 0.00            | 0.00              | 0.00  |      |
|              | Aguilón        | 113.45                         |               |                 |               | 78.04         |              |               | 45.37         |                |                    |                 |                   |       |      |
|              | La Paz         | 112.49                         |               |                 |               | 31.10         |              |               | 75.61         |                |                    |                 |                   |       |      |
|              | Moravia        | 184.06                         |               |                 |               | 53.13         |              |               | 103.20        |                |                    |                 |                   |       |      |
|              | Subtotal       | 438.93                         | 0.00          | 0.00            | 0.00          | 162.33        | 0.83         | 0.00          | 234.63        | 0.00           | 0.00               | 0.00            | 0.00              | 0.00  |      |
|              | Uramita        | 11.25                          |               |                 |               | 1.15          |              |               | 50.01         |                |                    |                 |                   |       |      |
|              | El Molino      | 1.63                           |               |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
|              | Subtotal       | 92.89                          | 0.00          | 0.00            | 0.00          | 2.15          | 0.63         | 0.00          | 60.91         | 0.00           | 0.00               | 41.72           | 0.00              | 0.00  |      |
|              | TOLIMA         | Chaparral                      | 2.15          |                 |               |               | 2.15         |               |               |                |                    |                 |                   |       |      |
| Prado        |                | 131.05                         | 20.23         |                 |               | 49.19         |              |               |               |                |                    |                 |                   |       |      |
| Robledo      |                | 486.04                         | 7.25          |                 |               | 59.04         |              |               |               |                |                    |                 |                   |       |      |
| San Andrés   |                | 39.81                          | 9.03          |                 |               | 23.11         |              |               |               |                |                    |                 |                   |       |      |
| Subtotal     |                | 602.77                         | 49.15         | 0.00            | 0.00          | 69.34         | 104.38       | 0.00          | 0.00          | 315.02         | 0.00               | 100.53          | 0.00              | 0.00  |      |
| Bursaco      |                | 52.43                          | 50.40         |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
| El Estero    |                | 119.55                         | 103.56        |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
| La Cruz      |                | 119.33                         | 104.72        |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
| San Bernardo |                | 8.25                           |               |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
| San Felipe   |                | 32.83                          | 19.65         |                 |               |               |              |               |               |                |                    |                 |                   |       |      |
| Subtotal     | 510.62         | 233.28                         | 0.00          | 0.00            | 0.00          | 0.00          | 0.00         | 0.00          | 0.00          | 0.00           | 0.00               | 0.00            | 0.00              |       |      |
| TOTAL        | 5010.78        | 631.74                         | 1109.63       | 0.60            | 608.23        | 240.15        | 0.00         | 0.00          | 512.77        | 459.66         | 0.00               | 270.63          | 0.21              | 0.60  |      |

Updated to November 30, 2004  
Sources: Spraying records, DIRAN polygrams  
October figures corrected based on spraying records

**ACCUMULATED TOTAL, 2004**

|  |                   |
|--|-------------------|
| <b>Total areas sprayed for illicit coca leaf crops, period January 1-November 30, 2004</b>   | <b>127,401.30</b> |
| <b>Total areas sprayed for illicit opium poppy crops, period January 1-November 30, 2004</b> | <b>3,060.76</b>   |

Note: Statistics are based on spraying records (See Table 1, Total areas sprayed for illicit coca-leaf crops – January-October 2004)

**CONSUMPTION OF GLYPHOSATE IN AERIAL SPRAYING OPERATIONS IN NOVEMBER 2004**

| BASE                         | CONSUMPTION (gal) |
|------------------------------|-------------------|
| <b>Larandia</b>              | <b>13.069,76</b>  |
| <b>San José del Guaviare</b> | <b>13.152,04</b>  |
| <b>Tres Esquinas</b>         | <b>193.55</b>     |
| <b>Villa Garzón</b>          | <b>9.253.02</b>   |
| <b>Neiva</b>                 | <b>4.0</b>        |
| <b>TOTAL</b>                 | <b>35.672,37</b>  |

Source: DIRAN

Comparing the theoretical consumption herbicide of 35,8 gallons (consumption in the areas sprayed), with that appeared in aircraft records (35,672.37) (discharged from storage tanks): there is a difference of -122.81 gallons. This difference is not significant (0.34%), and indicates that the mixture is being made in accordance with the dosage provided for the spraying of illicit crops of coca-leaf and opium poppy.

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### **3. EVALUATION OF PECIG ACTION AND ENVIRONMENTAL CONTROL.**

On November 9 and 30, 2004, officers of DIRAN, NAS and NAO, Dyncorp and PECIG audit met to program verification activities for coca-leaf spray areas in the period January-November 2004, following the protocol signed between the governments of United States of America and Colombia. The verification activities and programs to be conducted in the nuclei of Nariño, Caquetá-Putumayo, ,Guaviare-Meta, Arauca, Norte de Santander, Sur de Bolívar and Antioquia-Cordoba.

On November 20, 2004, officers of the Ministry of Environment, Housing and Regional Development, the National narcotics directorate, ICA, the Antinarcotics Police and the PECIG Audit made a helicopter overflight of the frontier area with Ecuador, in order to establish the state of vegetation cover, and to evaluate possible damage generated by aerial spraying. The overflight began from the west of the municipality of San Miguel, and reached the limits of the municipality of Puerto Asis Ecuador, on the banks of the River San Miguel, and subsequently turned back north, for a distance of some 5 km up river, advancing from East to West. At the date of this report, no aerial spraying of coca leaf crops has been made had in this sector since June 2004. Coca-leaf crops were observed in the area of the San Miguel basin, but not in the area of Ecuador.

In order to illustrate this verification we attach digital format photo files.

### **VERIFICATION OF COMPLAINTS**

On November 19 and 27, 2004, officers of the Antinarcotics Police, ICA, the Ministry of Environment, Housing and Regional Development and the National Narcotics Directorate made verification visits regarding complaints in the Department of Putumayo. A total of 194 complaints were verified from the

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Municipalities of Villa Garzón (42), Puerto Caicedo (54), Puerto Asis (62) Puerto Guzmán (9) and Orito (27). Verifications in the Municipalities of San Miguel and Valle del Guamuez remain pending. The observations were made in a low-altitude helicopter overflight, and a photographic record was taken as evidence of the visit, and is as support for the technical opinion.

Annex 3 -Chapter 4, shows the location of the sites checked, and the routes developed, by municipality.

**Field observations:**

- In the municipality of Orito, 12 sites (44%) were observed to have coca leaf crops.
- In the municipality of Puerto Guzmán, 6 sites (66%) were observed to have illicit crops.
- In the municipality of Puerto Asis, 55 sites (88%) were observed to have coca leaf crops, and 11 of them were mixed crops.
- In the municipality of Villa Garzón, there were 21 sites (50%) observed to have coca leaf crops, and three had mixed crops.
- A total of 194 sites were verified, and 48% were observed to have illicit crops of coca leaf, and 7% crops of coca leaf mixed or interspersed.

The analysis of photographic records and the technical opinions will be made by the Antinarcotics Police and the National Narcotics Directorate.

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#### 4. REFERENCE DOCUMENTATION, EVIDENCE AND ANNEXES.

This Chapter refers to documents consulted, some of which are attached by the Audit function as part of their work of follow-up of the activities of the program for the eradication of illicit crops by aerial spraying, in the period November 2004.

- Database "Complaints processed in accordance with Resolution 17/2004, of October 2001 ARECI-DNE (consulted)
- Weekly report of spraying activities-Magnetic records of spraying missions (Del Norte)<sup>1</sup> this year 2004 (consulted)
- Antinarcotics Police polygrams-data records and events for operations bases, ARECI (consulted)
- Photographic records of environment monitoring in the Caquetá-Putumayo nucleus. EMP Instruction Sheet 5. Taking of soil and water samples before and after spraying, November 20 and 27, 2004 (Digital attachment).
- Maps 1, 2, 3, 4, 5, 7 and 8 indicate areas which were the object of PECIG spraying in October 2004 (maps for the November period were not are not presented, since spraying records are not yet available at DIRAN). (Annex 1)
- Aerial spraying records with the glyphosate herbicide. Illicit crops of coca leaf and opium poppy. Bases of San Jose del Guaviare)(Guaviare), Larandia (Caquetá), Mobile bases at Tame (Arauca), Neiva (Huila) and Valledupar (Cesar). Perio October 1-31, 2004. (Annex 2).
- Routes used in the field visits, verifying on complaints in the Municipalities of Orito, Puerto Asis, Puerto Caicedo, Puerto Guzmán and Villa Garzón (Annex 3)

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<sup>1</sup> The lists of spraying records for the previous month are attached, since the contractor company responsible for processing the data has to compile data from each operations base and send it to the United States. The data are reviewed and sent back to the Bogotá offices. This process may take some 15 days after the end of the period audited, after which DIRAN will have them available. Likewise, maps are presented with one month's delay, because the spraying files are basic for their preparation.



- Note of record of the Contingency Plan- EMP Instruction Sheet 8 -Spraying base at San Jose del Guaviare - Area for the eradication of illicit crops - Antinarcotics Directorate. November 3, 2004 (Annex 4).
- Note of record of spraying, No. 001, mentioning the washing of bins in which glyphosate herbicide had been stored, and which were emptied on 13, 15 and 16 October, 2004 in the mix made for the spraying of illicit opium-poppy crops. Antinarcotics Directorate. Neiva Mobile spraying base.
- (Annex 5)
- Laboratory analysis of mixer personnel for agricultural chemicals, Mr Angel Arciniegas-Waltreos, No. 0022994; Jimmy Alexander Guzmán-Rojas No. 0022997 and Alexander Medrano-Fonseca No. 0022999, and Jesus Adolfo Parra-Caballero, No. 0023005. Analizar Automated Clinical Laboratory (Annex 6)
- Certification for the Course "Appropriate and effective use of products for the protection of crops and techniques for application on the ground", ICA, and Sygenta.S. A., Codazzi, Cesar November 3, 2004 (Annex 7).

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## 5. RECOMMENDATIONS

The recommendations that follow are based on the information collected on forms and in the activities described in the Environmental Management Plan.

**Operations base for San Jose Del Guaviare (Guaviare), Larandia (Caquetá), mobile bases at Tame (Arauca) Neiva (Huila) and Villa Garzón (Huila)**

The recommendations given are applicable to all bases currently operating in Colombia.

### **Spraying operations management program for the.**

- Effect calibration of spraying systems for the aircraft PNC3040 and 3045, since on November 4 and November 6, 2004, there were large differences between the volume of mix used in spraying (according to the Del Norte recording system), and the volume deposited in the aircraft's tank.

### **Industrial safety program in operations bases.**

- Mixers should be motivated to use their industrial safety equipment all the time, with short, sharp talks on industrial safety.
- The bypass valves of emergency drains from the agricultural chemicals stores and fuel stores should always be kept closed.

### **Solid waste management program.**

- The identification of the receptacles for the collection of residues must be kept permanently current, and in accordance with material to be separated.
- The refuse bins must be relocated, or a system of fixing or supports must be made available, since the turbulence of aircraft engines knocks them over. (SJG Base).

### **Wastewater management program at PECIG bases.**

- All the sand traps must be cleaned and refuse deposited in the channel to the industrial wastewater reutilization plant (SJG base), must be removed, though. This refuse is generated by the action of turbulence of the helicopter and aircraft rotors full of turbulence.
- Water from the region the reutilization plant must be removed as rapidly as possible in mixing activities, since the storage tank overflows rapidly during the rainy season. Although there is an ancillary tank, volumes may exceed its storage capacity.
- The condition of the wastewater re-utilization plant filter should be checked (SJG base).
- We recommend that the wastewater re-utilization plant at Arauca receive maintenance, (cleaning of filters, cleaning of cells).

### **Contingency plan program.**

Follow up environmental contingencies (discharges of mixtures), occurring during this period.

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## 6. SUMMARY

With regard to the spraying activities in the period November 1-30, 2004 in the Departments of Caquetá (Albania, Cartagena del Chaira, Florencia, Montañita. Milán. Paujíl, Puerto Rico, Solano., San José de La Fragua, Solital. San Vicente del Caguán, Valparaiso), Cauca (Piamonte, Santa Rosa) Guaviare (Calamar, El Retorno, Miraflores, San José del Guaviare), Meta (Mapiripán, Puerto Concordia, Puerto Rico (Putumayo) Mocoa, Orito, Puerto Guzmán, Puerto Asis, Villa Garzón, Vichada (Carurú) 13,061.96 ha were sprayed for it illicit coca-leaf crops, for an accumulated total in 2004 of 127,401.30 ha sprayed.

In the Department of Huila (Colombia), it was reported that 8.1 ha have been sprayed for the illicit opium-poppy crops. In 2004, the accumulated total is 3,060.76 ha sprayed.

Environmental monitoring activities were undertaken (Instruction Sheet 5), in the Caquetá-Putumayo nucleus (collection of soil samples before and after spraying).

Complaints were verified in the Department of Putumayo, municipalities of Villa Garzón, Puerto Guzmán, Puerto Caicedo, Puerto Asis and Orito (EMP Instruction Sheet 6).



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**Annex 41-E**

**AUDIT TO THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS  
BY AERIAL SPRAYING WITH GLYPHOSATE HERBICIDE. *REPORT No.*  
3. AUDITED PERIOD: 19 DECEMBER 2006 TO 18 JANUARY 2007,  
JANUARY 2007**

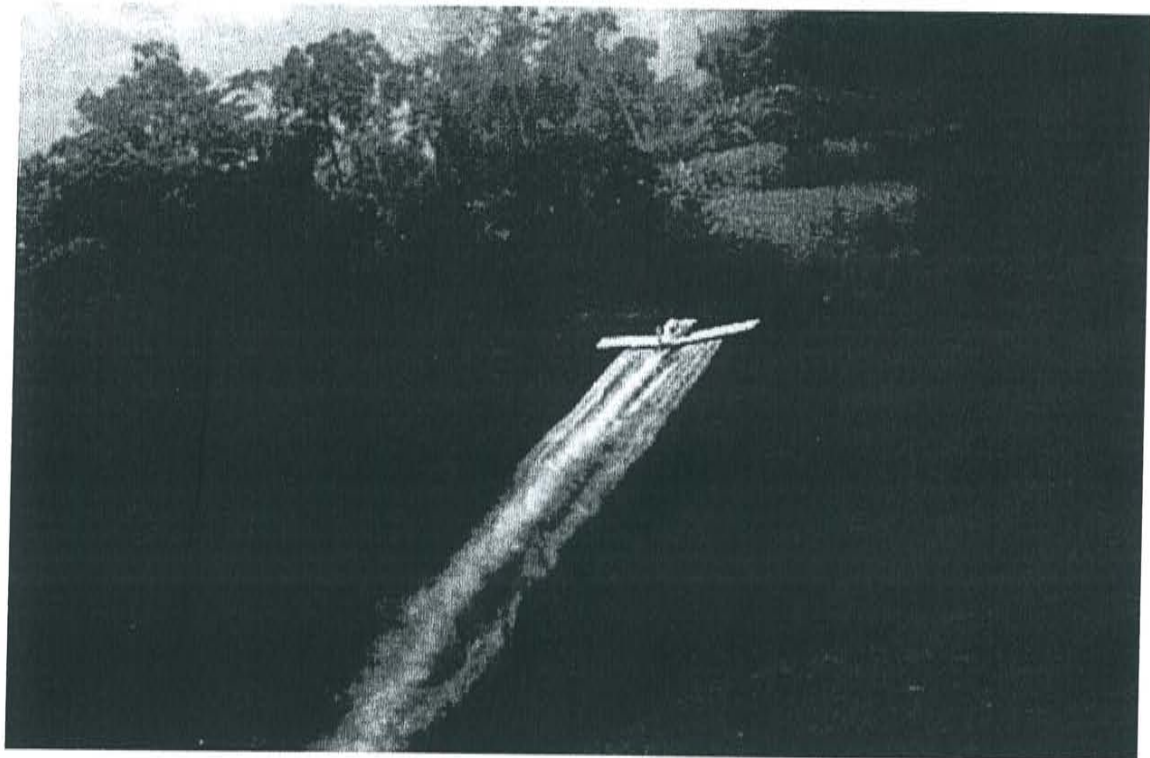
*(Archives of the Colombian Foreign Ministry)*

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|   | Dec 19, 2006 to Jan 18, 2007   |   |
|   | "Audit of the eradication of illicit crops by aerial spraying with glyphosate" |   |

**NATIONAL NARCOTICS DIRECTORATE - DNE**



AUDIT CONTRACT No. 027 OF 2006

**AUDIT OF THE PROGRAM FOR ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE**



**REPORT No. 3**  
**AUDIT PERIOD: 19 DECEMBER 2006 TO 18 JANUARY 2007**  
**CONTRACTOR: UNIÓN TEMPORAL AUDITORÍA PMA**

**BOGOTA D.C., JANUARY 2007**



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## 1. INTRODUCTION

This report presents the development of the activities performed during the Audit of the Program for the Eradication of Illicit Crops By Aerial Spraying with Glyphosate (hereinafter PECIG).

The procedure employed for this Audit has been to verify that all activities involving the implementation of PECIG are developed based on the requirements of Resolution 1054 of 2003 issued by the Ministry for the Environment, Housing and Territorial Development (hereinafter MAVDT). This Management Plan governs the implementation of certain preventive, technical and operational measures that allow the spraying, detection and verification operations to be conducted properly. It also controls, on Records 2, 3 and 4, the adoption of Industrial Safety, Solid Waste and Wastewater Management regulation in Operating Bases; on Record 5 it regulates the performance of regular environmental monitoring to determine if spray operations have effects on soil and water resources within the nuclei in which the program operates. On the other hand, Records 6 and 7 require the execution of Communication, Public Health and Social Management Programs that are directed to the community and finally, on Record 8 of said resolution, it regulates the adoption of a Contingency Plan to facilitate decision-making and implementation of measures for immediate action in the event of handling an emergency caused by the PECIG.



Considering the implications of the Program at the national level, a complaint handling system has been implemented pursuant to the requirements of Resolution 017 of 2001, which establishes a procedure that the Anti Narcotics Police (hereinafter DIRAN) must satisfy when addressing complaints arising from the alleged damage caused by aerial spraying with glyphosate in the framework of the Program to Eradicate Illicit Crops.

This report includes Audit of all procedures relating to the operation of the Program activities, implementation of the Environmental Management Plan and the complaint handling system from December 19, 2006 to January 18, 2007.

## 2. JUSTIFICATION

The PECIG Audit is substantiated under the requirements of Resolutions 013 of June 27, 2003 and 031 of September 27, 2003, which establish that the Program for the Eradication of Illicit Crops By Aerial Spraying with Glyphosate - PECIG must have a permanent audit for the control and monitoring of spraying operations in the different areas of operation thereof, and in each of the bases.



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### 3. BACKGROUND



The Program for the Eradication of Illicit Crops By Aerial Spraying with Glyphosate has been implemented in the country for several years, with the aim to definitely eradicate, if possible, the areas of illicit crops that have been developed with the passing of the years.

The UNION TEMPORAL AUDITORÍA PMA began Audit work on the PECIG operation on October 18, 2006, and it has produced two reports that contain the activities in each of the periods.

The report for the period between November 19 and December 18, 2006 refers to the audit of the different procedures that make up the PECIG, which operated for that period in the provinces of Caquetá, Guaviare, Meta, Nariño, Putumayo and Vichada, spraying a total of 11,730.95 hectares of coca. As a result of the audit of the detection and spraying operations of this period, it was concluded that the proceedings have been conducted properly, complying with the requirements of Record 1 of the Environmental Management Plan (Resolution 1054 of 2003 issued by MAVDT).

The audit of compliance with the requirements of the Records 2, 3 and 4 of the Environmental Management Plan was conducted on the operation base at San Jose del Guaviare, identifying some of the noncompliance findings, consequently raising the necessary recommendations. In addition, an audit was performed on the implementation of Records 6 and 7—responsibility of the National Narcotics Directorate (hereinafter DNE) and the National Health Institute (hereinafter INS), respectively—and which were implemented throughout the country for the provision of care, communication and training on the operation of PECIG to the community.



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## 4. OBJECTIVES



### 4.1 General Objective

To perform the Audit of the Program for the Eradication of Illicit Crops By Aerial Spraying with Glyphosate for the period from December 19, 2006 to January 18, 2007.

### 4.2 Specific Objectives

- To perform follow-up audit of the operation of the Program for the Eradication of Illicit Crops By Aerial Spraying with Glyphosate
- To perform follow-up audit of the Environmental Management Plan
- To perform audit of the Complaint Process for alleged damage caused by the PECIG operation
- To perform audit and participate in verification activities carried out during the audited period



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## 5. OPERATION BASES OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG) – ANTI-NARCOTICS POLICE (DIRAN)

In the period from December 19, 2006 and January 18, 2007, spraying operations were conducted from the following bases:

| Type of Base | Base Name             | Sprayed Provinces | Sprayed Area (ha)                      |
|--------------|-----------------------|-------------------|--|
| Fixed        | San José del Guaviare | Guaviare, Meta    | Guaviare: 1,228.24<br>Meta: 1,344.34   |
| Fixed        | Larandia              | Caquetá           | Caquetá: 432.14                        |
| Mobile       | Popayán               | Cauca             | Cauca: 278.43                          |
| Mobile       | Villagarzón           | Putumayo, Nariño  | Putumayo: 11,583.18<br>Nariño: 1,037.6 |

The Audit for the Records 2, 3 and 4 was developed on the Operations Base at Popayan, which included a field visit. The results are revealed throughout the development of this report.



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## 6. FOLLOW-UP AUDIT TO THE OPERATION OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG)

In accordance with the provisions on Record 1 of Resolution 1054 of 2003 (MAVDT), the stages of the PECIG Operation are:

- Detection Phase
- Spraying Stage
- Verification Stage

### 6.1 Detection Phase

Audit of the stage for the detection of illicit crops is made following this procedure:

- Verification of the processes applied to satellite images, which should be: georeferencing, classification and identification of illicit crops
- Analysis of how these data are used in reconnaissance missions
- Review of the written reports of the detection reconnaissance made by DIRAN before the spraying operations
- Verify that within the reconnaissance report the information on the location, spatialization and quantification of illicit crops is included
- Review of the various photographic annexes of these reports
- Verify that the mapping takes into account the location of human settlements, indigenous reserves, water sources, identification of land use, ecologically fragile areas, and environmental, social and economically sensitive areas



#### 6.1.1 Discoveries Made by the Integrated Illicit Crop Monitoring System (hereinafter SIMCI)

In order to evaluate the procedure performed at this stage, we analyzed the satellite imagery used for the detection of illicit crops in the period audited. What was observed during this analysis was that the images were georeferenced, classified and characterized, and furthermore, were aimed at identifying the presence of illicit crops, locating the exclusion zones for the analysis.

Attached are two images that were reviewed for this period, corresponding to the provinces of Guaviare and Vaupes (Images 1 and 2 respectively). These images characterize the existence of coca in the mentioned provinces.

There is a slight banding and some clouds appear in the images, both of which provide a higher than 75% percentage of image analyzed, which is not a limiting factor for proper image



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interpretation.

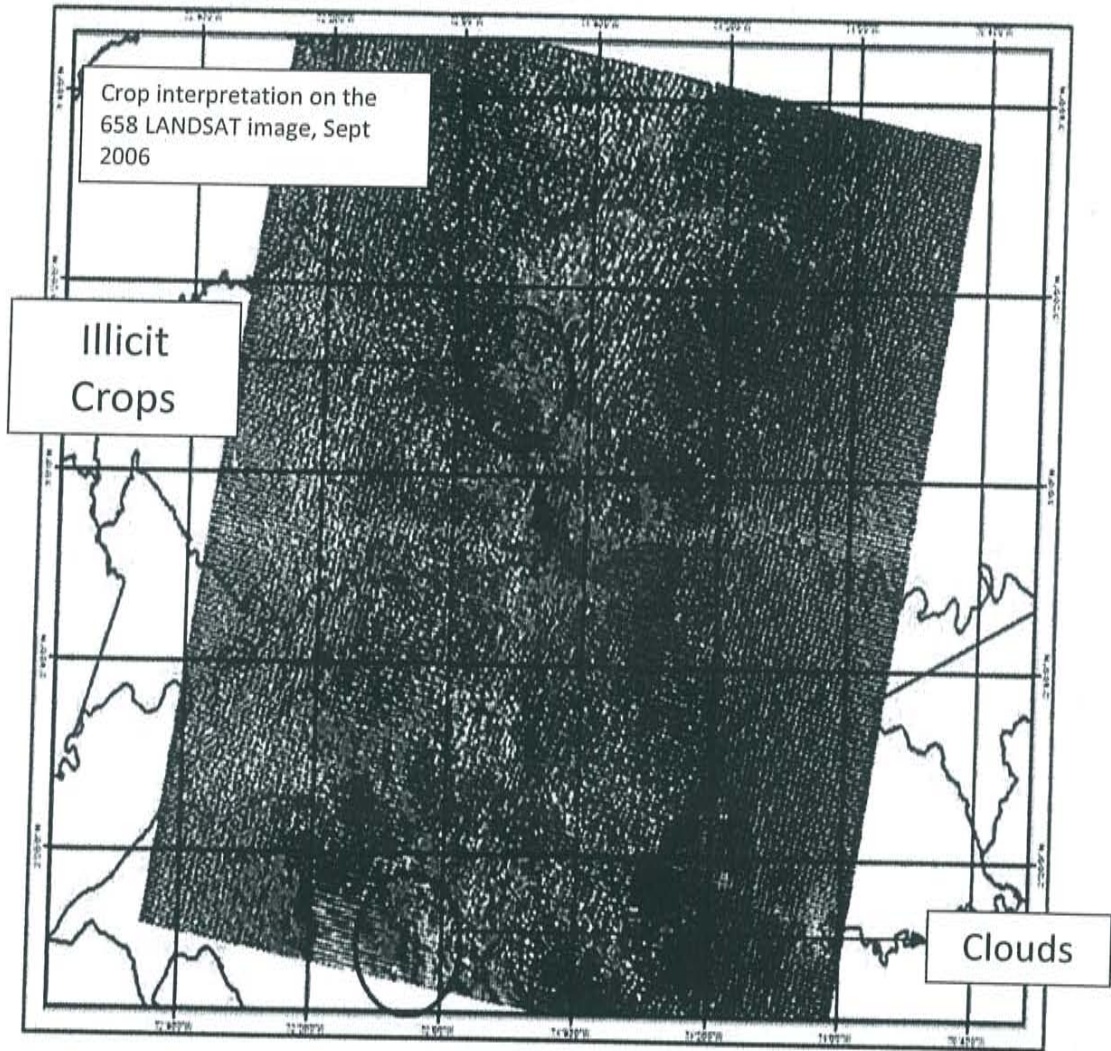
LANDSAT image 658 (Image 1) refers to the month of September 2006 and it was one of the images used for the detection of coca in the province of Guaviare. These crops appear as light green points, and the municipal boundaries are shown in red.

The bottom section of the image shows the presence of clouds and some banding, factors that may interfere with the detection of illicit crops, but the quality of the rest of the image allows defining a useful area of 95%, which permits a good identification of the illicit crops and of other types of vegetation in the area.





Image 1: Interpretation of Crops in the LANDSAT 658 Image (Province of Guaviare)



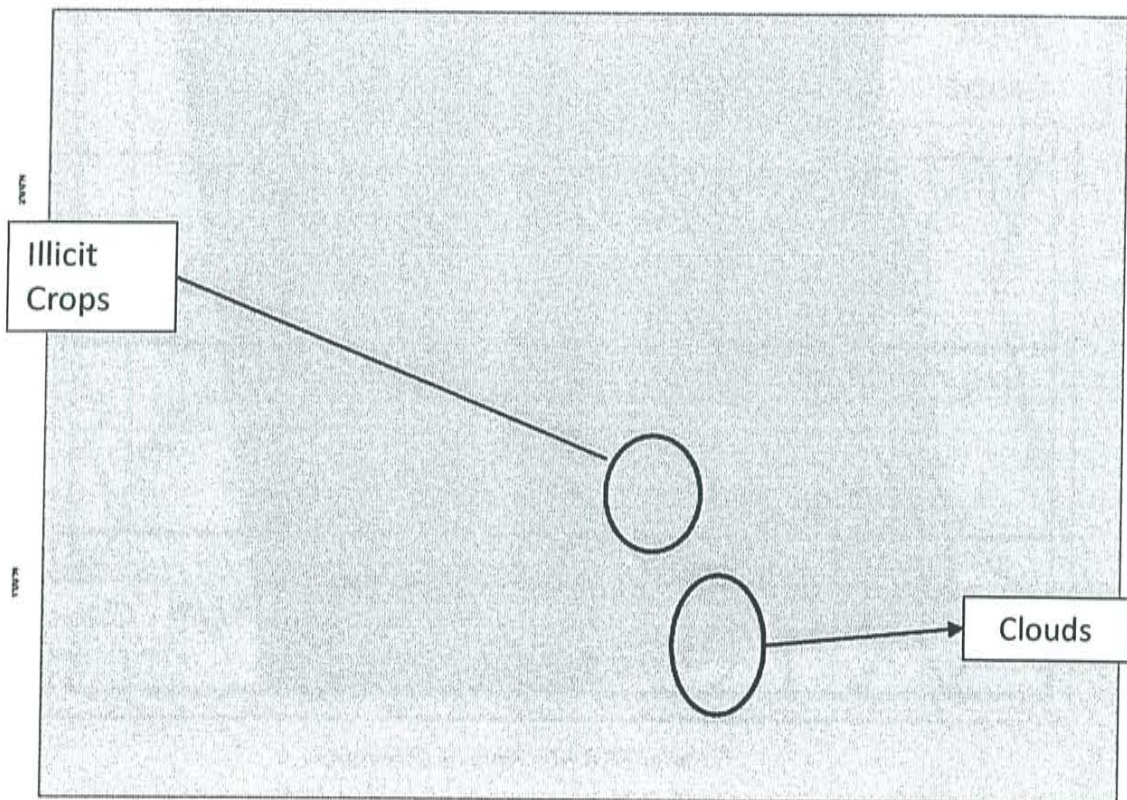
Source: DIRAN Area of detection



The image displayed below, referenced as LANDSAT 559, was taken in October of 2006 and it corresponds to the Province of Vaupés, showing the presence of coca crops in red. Approximately 80% of these crops were detected in the town of Mitu (please see the center of the picture).



Appearing towards the bottom right of the image is the presence of clouds which could have interfered with the detection of illicit crops in this area. However, after analyzing all the image the result is that it has a useful area of 75%.

**Image 2: Crop Interpretation on the LANDAST Image 5-59 (Province of Vaupés)**



Source: DIRAN area of detection



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### 6.1.2 Detection performed by the DIRAN (Reconnaissance)



This stage is designed to complement the SIMCI detection operations and to provide operational support to the spraying missions. It consists of reconnaissance based on the identification of illicit crops, using satellite images that are delivered in the SIMCI report as the main support. Then, based on these, the respective field work is performed which in turn generates the Reconnaissance Reports, allowing to obtain the quantification and location of crops, and the respective photographic record.

In order to audit and verify the proper development of these processes, the reconnaissance reports generated in this period were analyzed. These reports contain the support of the visual reconnaissance in both the quantification and location tables using the Global Positioning System (hereinafter GPS), and in the photographic records (Figures 4 and 5). These elements enabled the proper classification and placement of illegal crops in the provinces of Putumayo, Meta, Guajira, Antioquia, Bolívar, Córdoba, Guaviare and Norte de Santander.

Given that each reconnaissance report that is generated has its respective photographic record, the Audit verified that the location of the areas where the presence of coca crops was detected was included therein.

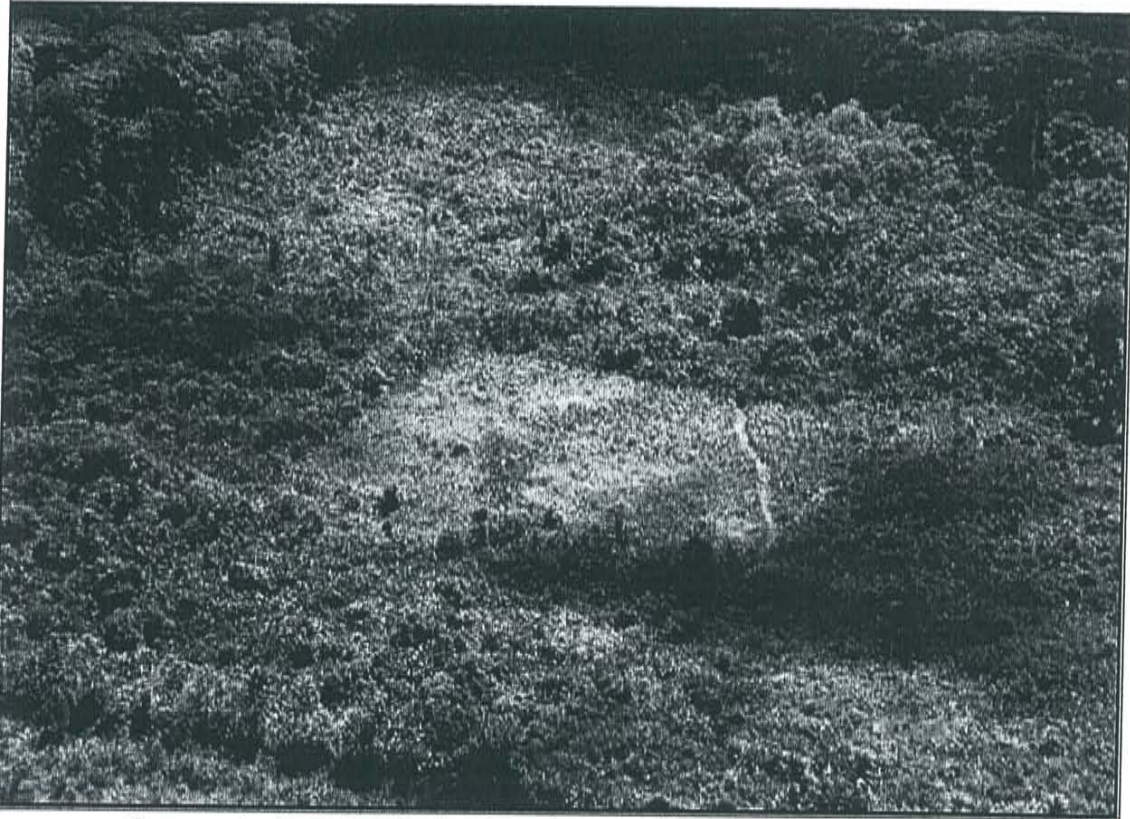
In order to provide a sample of what is discussed in this period, the images relating to the reconnaissance of the detection of illicit crops in the province of Putumayo were selected. As seen in them, illicit crops were detected in the midst of fairly dense secondary forest which causes severe damage to the ecosystem, destroying a significant area of flora, and therefore fauna, present in the area.



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**Image 3: Reconnaissance of Coca in the Province of Putumayo**



**Coordinates: N 0° 23' 30 - W 76 ° 23' 35”**



Comments: Coca Cultivation in an intervened area of secondary forest

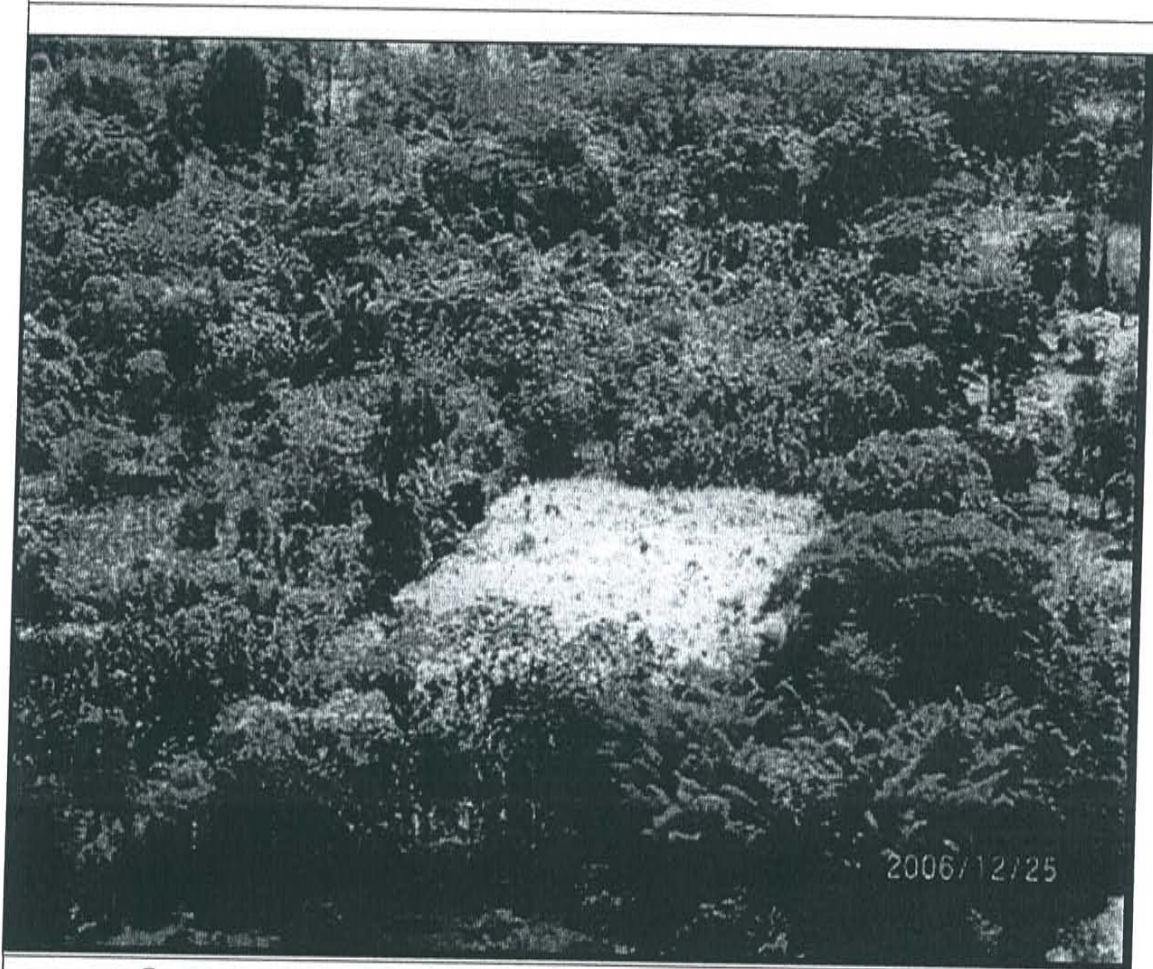
Source: Detection Group, Area Illicit Crop Eradication - ARECI (DIRAN)



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**Image 4: Reconnaissance of Coca in the Province of Putumayo**



**Coordinates: N 0° 23' 60 - W 76 ° 17' 40”**



Comments: Coca Cultivation in an intervened area of secondary forest

Source: Detection Group, Area Illicit Crop Eradication - ARECI (DIRAN)



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### 6.1.3 Audit Findings

After auditing the activities within the detection process, the conclusion is that they meet the required parameters in Record 1 of the Environmental Management Plan. Therefore, no findings were identified.

### 6.1.4 Audit Conclusions

After the review of the images used for the detection of illicit crops for this period, it was determined they were processed properly, and are duly classified and georeferenced, which is why the audit found that they meet the required parameters in Record 1 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT).

### 6.1.5 Audit Recommendations

Based on the audit conducted on the detection process it is recommended that these operations continue to develop with the methodology used so far.

## 6.2 Spraying Stage

In order to audit the procedure used to conduct the spraying operations in this period, the Audit shall be based on the requirements of Record 1 of the Environmental Management Plan, in regard to the implementation of preventive measures for the Spraying Operations, technical and operational measures prior to the execution of the spraying and the Spraying Operations as such.

### 6.2.1 Preventive Measures for the Spraying Operations:



As required by section 3.1 of Record 1 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT), the spraying operations that take place in any nucleus in the country must comply with the following preventive measures:

- Perform the maintenance, review and calibration of spraying equipment in aircraft
- Comply with the technical and operational parameters for the application of the herbicide, as established in the Environmental Management Plan
- Comply with environmental zoning criteria of this Record

The Audit verified that the preventive measures mentioned above are applied in the spraying operations since the maintenance, review and calibration of spraying equipment in aircraft is being conducted.

With regard to basic environmental zoning for each operation, the audit confirmed that this takes



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place in the DIRAN Office of Verification and Environmental Management Plan. It has identified the ecologically fragile areas, environmental, social and economically sensitive areas and land uses.

### 6.2.2 Pre-Spraying Technical and Operational Measures



Record 1 of the Environmental Management Plan presents some operational parameters that must be met at the time of spraying; these parameters can be seen in the following table:

**Table 1: Operational Parameters of the Program For Eradication Of Illicit Crops By Aerial Spraying**

| PARAMETER  | UNIT OF MEASURE | VALUE OR RANGE  |       |
|--|-----------------|---|-------|
|  |                 | COCA  | POPPY |
| Flight Altitude  | Meters          | The maximum height of 50 meters will apply, however the operation will be subject to the height of the obstacles present in the areas under spraying. |       |
| Maximum discharge of commercial formulation with glyphosate. | Liters/hectare  | 10.4  | 2.5   |
| Droplet size   | Microns         | 300 - 1000  |       |
| Expected drift   | Meters          | < 5   |       |
| Maximum ambient temperature for application                  | Degrees Celsius | 35  | 20    |
| Maximum wind speed   | Knots           | 5   |       |

Source: Record 1, page 6 of the Environmental Management Plan, Resolution 1054 of 2003 (MAVDT)



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The audit found that parameters are verified as follows:

- Maximum discharge of formulation with glyphosate: records that were found in the reports of the daily activities that the manager of the Environmental Management Plan of the Bases sends to the DIRAN
- Weather conditions (wind speed, maximum ambient temperature for the application, expected drift): Audit confirmed that records exist (Spraying Records) evidencing the non spraying when these conditions are not within the standards established in Table 1
- Droplet size: this is ensured by calibration, prior to spraying, of the spraying equipment of the aircraft

### 6.2.3 Spraying Operations

In order to audit the spraying operations that took place during this period, the review of spraying lines was conducted. These were consulted in the DIRAN Detection Area. This analysis produced Table 2, which quantifies the hectares sprayed by province and municipality.

**Table 2: Quantification of illicit crops sprayed, by Municipality and Province**

| DAY | MONTH    | YEAR | AREA   | PROVINCE | MUNICIPALITY          |
|-----|----------|------|--------|----------|-----------------------|
| 18  | DECEMBER | 2006 | 20.65  | META     | LA MACARENA           |
| 18  | DECEMBER | 2006 | 39.96  | META     | PUERTO LLERAS         |
| 18  | DECEMBER | 2006 | 101.41 | META     | PUERTO RICO           |
| 18  | DECEMBER | 2006 | 717.05 | PUTUMAYO | SAN MIGUEL            |
| 18  | DECEMBER | 2006 | 20.86  | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 18  | DECEMBER | 2006 | 15.80  | META     | VISTA HERMOSA         |
| 19  | DECEMBER | 2006 | 3.55   | GUAVIARE | CALAMAR               |
| 19  | DECEMBER | 2006 | 224.66 | PUTUMAYO | PUERTO ASÍS           |
| 19  | DECEMBER | 2006 | 6.44   | META     | PUERTO LLERAS         |
| 19  | DECEMBER | 2006 | 75.88  | META     | PUERTORICO            |
| 19  | DECEMBER | 2006 | 2.46   | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 19  | DECEMBER | 2006 | 233.71 | PUTUMAYO | SAN MIGUEL            |
| 19  | DECEMBER | 2006 | 244.29 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 19  | DECEMBER | 2006 | 27.11  | META     | VISTA HERMOSA         |
| 20  | DECEMBER | 2006 | 0.39   | GUAVIARE | CALAMAR               |
| 20  | DECEMBER | 2006 | 0.93   | GUAVIARE | EL RETORNO            |
| 20  | DECEMBER | 2006 | 579.59 | PUTUMAYO | PUERTO ASÍS           |
| 20  | DECEMBER | 2006 | 19.87  | META     | PUERTO LLERAS         |
| 20  | DECEMBER | 2006 | 28.88  | META     | PUERTO RICO           |
| 20  | DECEMBER | 2006 | 5.23   | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 20  | DECEMBER | 2006 | 251.12 | PUTUMAYO | SAN MIGUEL            |
| 20  | DECEMBER | 2006 | 23.81  | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 20  | DECEMBER | 2006 | 106.64 | META     | VISTA HERMOSA         |
| 21  | DECEMBER | 2006 | 43.02  | GUAVIARE | CALAMAR               |
| 21  | DECEMBER | 2006 | 134.31 | GUAVIARE | EL RETORNO            |
| 21  | DECEMBER | 2006 | 81.74  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 23  | DECEMBER | 2006 | 215.50 | NARIÑO   | IPIALES               |
| 23  | DECEMBER | 2006 | 212.52 | PUTUMAYO | LEGUIZAMO             |
| 23  | DECEMBER | 2006 | 102.76 | PUTUMAYO | PUERTO ASÍS           |
| 23  | DECEMBER | 2006 | 408.78 | PUTUMAYO | SAN MIGUEL            |
| 23  | DECEMBER | 2006 | 336.36 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 24  | DECEMBER | 2006 | 136.44 | NARIÑO   | IPIALES               |
| 24  | DECEMBER | 2006 | 76.07  | PUTUMAYO | LEGUIZAMO             |







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|    |          |      |        |          |                       |
|----|----------|------|--------|----------|-----------------------|
| 24 | DECEMBER | 2006 | 89.74  | PUTUMAYO | PUERTO ASÍS           |
| 24 | DECEMBER | 2006 | 375.13 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 25 | DECEMBER | 2006 | 118.29 | NARIÑO   | IPIALES               |
| 25 | DECEMBER | 2006 | 25.09  | PUTUMAYO | LEGUÍZAMO             |
| 25 | DECEMBER | 2006 | 23.89  | PUTUMAYO | PUERTO ASÍS           |
| 25 | DECEMBER | 2006 | 204.63 | PUTUMAYO | SAN MIGUEL            |
| 25 | DECEMBER | 2006 | 582.80 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 26 | DECEMBER | 2006 | 102.34 | PUTUMAYO | PUERTO ASÍS           |
| 27 | DECEMBER | 2006 | 8.76   | NARIÑO   | IPIALES               |
| 27 | DECEMBER | 2006 | 3.72   | PUTUMAYO | ORITO                 |
| 27 | DECEMBER | 2006 | 344.89 | PUTUMAYO | PUERTO ASÍS           |
| 27 | DECEMBER | 2006 | 68.99  | PUTUMAYO | PUERTO CAICEDO        |
| 27 | DECEMBER | 2006 | 483.57 | PUTUMAYO | SAN MIGUEL            |
| 27 | DECEMBER | 2006 | 396.01 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 28 | DECEMBER | 2006 | 47.53  | META     | MAPIRIPÁN             |
| 28 | DECEMBER | 2006 | 60.84  | META     | PUERTO LLERAS         |
| 28 | DECEMBER | 2006 | 20.79  | META     | PUERTO RICO           |
| 29 | DECEMBER | 2006 | 42.65  | CAQUETÁ  | ELPAUJIL              |
| 29 | DECEMBER | 2006 | 40.92  | CAQUETÁ  | LA MONTAÑITA          |
| 29 | DECEMBER | 2006 | 35.28  | META     | PUERTO LLERAS         |
| 29 | DECEMBER | 2006 | 4.65   | META     | PUERTO RICO           |
| 30 | DECEMBER | 2006 | 88.59  | META     | PUERTO LLERAS         |
| 30 | DECEMBER | 2006 | 18.40  | META     | PUERTO RICO           |
| 31 | DECEMBER | 2006 | 9.47   | CAQUETÁ  | PUERTO RICO           |
| 31 | DECEMBER | 2006 | 2.94   | META     | CARTAGENA DEL CHAIRÁ  |
| 31 | DECEMBER | 2006 | 372.81 | PUTUMAYO | MAPIRIPÁN             |
| 31 | DECEMBER | 2006 | 58.76  | META     | PUERTO ASÍS           |
| 1  | JANUARY  | 2007 | 34.66  | PUTUMAYO | PUERTO CONCORDIA      |
| 1  | JANUARY  | 2007 | 319.31 | PUTUMAYO | ORITO                 |
| 1  | JANUARY  | 2007 | 43.72  | PUTUMAYO | PUERTO ASÍS           |
| 1  | JANUARY  | 2007 | 48.14  | PUTUMAYO | PUERTO CAICEDO        |
| 1  | JANUARY  | 2007 | 543.97 | PUTUMAYO | SAN MIGUEL            |
| 2  | JANUARY  | 2007 | 64.73  | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 2  | JANUARY  | 2007 | 15.19  | PUTUMAYO | LEGUÍZAMO             |
| 2  | JANUARY  | 2007 | 125.10 | PUTUMAYO | ORITO                 |
| 2  | JANUARY  | 2007 | 527.44 | PUTUMAYO | SAN MIGUEL            |
| 3  | JANUARY  | 2007 | 121.83 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 3  | JANUARY  | 2007 | 111.24 | PUTUMAYO | LEGUÍZAMO             |
| 3  | JANUARY  | 2007 | 81.98  | META     | PUERTO ASÍS           |
| 3  | JANUARY  | 2007 | 23.93  | META     | PUERTO LLERAS         |
| 3  | JANUARY  | 2007 | 47.90  | CAQUETÁ  | PUERTO RICO           |
| 4  | JANUARY  | 2007 | 43.50  | GUAVIARE | SOLITA                |
| 4  | JANUARY  | 2007 | 82.96  | GUAVIARE | CALAMAR               |
| 4  | JANUARY  | 2007 | 158.61 | PUTUMAYO | EL RETORNO            |
| 4  | JANUARY  | 2007 | 19.47  | PUTUMAYO | LEGUÍZAMO             |
| 4  | JANUARY  | 2007 | 34.77  | PUTUMAYO | PUERTO ASÍS           |
| 4  | JANUARY  | 2007 | 107.29 | PUTUMAYO | PUERTO GUZMÁN         |
| 5  | JANUARY  | 2007 | 21.65  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 5  | JANUARY  | 2007 | 18.50  | GUAVIARE | CALAMAR               |
| 5  | JANUARY  | 2007 | 94.32  | GUAVIARE | EL RETORNO            |
| 5  | JANUARY  | 2007 | 73.46  | PUTUMAYO | LEGUÍZAMO             |
| 5  | JANUARY  | 2007 | 11.93  | PUTUMAYO | PUERTO ASÍS           |
| 5  | JANUARY  | 2007 | 85.34  | META     | PUERTO CONCORDIA      |
| 5  | JANUARY  | 2007 | 277.46 | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 5  | JANUARY  | 2007 | 268.88 | PUTUMAYO | SAN MIGUEL            |
| 6  | JANUARY  | 2007 | 456.54 | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 6  | JANUARY  | 2007 | 88.47  | NARIÑO   | IPIALES               |
| 6  | JANUARY  | 2007 | 80.87  | PUTUMAYO | LEGUÍZAMO             |
| 6  | JANUARY  | 2007 |        | PUTUMAYO | PUERTO ASÍS           |







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|                                      |         |      |        |          |                       |
|--------------------------------------|---------|------|--------|----------|-----------------------|
| 6                                    | JANUARY | 2007 | 74.39  | META     | PUERTO RICO           |
| 6                                    | JANUARY | 2007 | 60.46  | PUTUMAYO | SAN MIGUEL            |
| 7                                    | JANUARY | 2007 | 4.27   | GUAVIARE | CALAMAR               |
| 7                                    | JANUARY | 2007 | 6.34   | GUAVIARE | EL RETORNO            |
| 7                                    | JANUARY | 2007 | 487.06 | PUTUMAYO | PUERTO ASÍS           |
| 7                                    | JANUARY | 2007 | 103.94 | PUTUMAYO | PUERTO CAICEDO        |
| 7                                    | JANUARY | 2007 | 113.28 | META     | PUERTO RICO           |
| 7                                    | JANUARY | 2007 | 3.72   | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 8                                    | JANUARY | 2007 | 44.11  | GUAVIARE | CALAMAR               |
| 8                                    | JANUARY | 2007 | 31.03  | GUAVIARE | EL RETORNO            |
| 8                                    | JANUARY | 2007 | 428.91 | PUTUMAYO | PUERTO ASÍS           |
| 8                                    | JANUARY | 2007 | 21.79  | META     | PUERTO CONCORDIA      |
| 8                                    | JANUARY | 2007 | 43.38  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 8                                    | JANUARY | 2007 | 2.85   | PUTUMAYO | VALLE DEL GUAMUÉZ     |
| 9                                    | JANUARY | 2007 | 5.62   | GUAVIARE | CALAMAR               |
| 9                                    | JANUARY | 2007 | 0.54   | GUAVIARE | EL RETORNO            |
| 9                                    | JANUARY | 2007 | 288.25 | PUTUMAYO | PUERTO ASÍS           |
| 9                                    | JANUARY | 2007 | 27.22  | META     | PUERTO CONCORDIA      |
| 9                                    | JANUARY | 2007 | 5.85   | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 10                                   | JANUARY | 2007 | 34.54  | GUAVIARE | CALAMAR               |
| 10                                   | JANUARY | 2007 | 1.43   | CAQUETÁ  | ELPAUJIL              |
| 10                                   | JANUARY | 2007 | 21.36  | GUAVIARE | EL RETORNO            |
| 10                                   | JANUARY | 2007 | 20.50  | CAQUETÁ  | FLORENCIA             |
| 10                                   | JANUARY | 2007 | 47.72  | CAQUETÁ  | LA MONTAÑITA          |
| 10                                   | JANUARY | 2007 | 256.94 | PUTUMAYO | PUERTO GUZMÁN         |
| 10                                   | JANUARY | 2007 | 3.56   | CAQUETÁ  | PUERTO RICO           |
| 10                                   | JANUARY | 2007 | 70.39  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 11                                   | JANUARY | 2007 | 22.52  | GUAVIARE | CALAMAR               |
| 11                                   | JANUARY | 2007 | 0.69   | CAQUETÁ  | ELPAUJIL              |
| 11                                   | JANUARY | 2007 | 16.94  | GUAVIARE | EL RETORNO            |
| 11                                   | JANUARY | 2007 | 1.05   | CAQUETÁ  | LA MONTAÑITA          |
| 11                                   | JANUARY | 2007 | 222.87 | PUTUMAYO | PUERTO GUZMÁN         |
| 11                                   | JANUARY | 2007 | 79.66  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 14                                   | JANUARY | 2007 | 102.07 | NARIÑO   | IPIALES               |
| 14                                   | JANUARY | 2007 | 175.07 | PUTUMAYO | PUERTO GUZMÁN         |
| 14                                   | JANUARY | 2007 | 12.58  | META     | PUERTO RICO           |
| 14                                   | JANUARY | 2007 | 42.45  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 15                                   | JANUARY | 2007 | 12.82  | META     | PUERTO LLERAS         |
| 15                                   | JANUARY | 2007 | 83.50  | CAQUETÁ  | PUERTO RICO           |
| 15                                   | JANUARY | 2007 | 0.90   | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 15                                   | JANUARY | 2007 | 106.31 | META     | VISTA HERMOSA         |
| 16                                   | JANUARY | 2007 | 22.23  | META     | PUERTO LLERAS         |
| 16                                   | JANUARY | 2007 | 132.75 | CAQUETÁ  | PUERTO RICO           |
| 16                                   | JANUARY | 2007 | 55.46  | META     | VISTA HERMOSA         |
| 17                                   | JANUARY | 2007 | 76.36  | GUAVIARE | EL RETORNO            |
| 17                                   | JANUARY | 2007 | 73.60  | CAUCA    | EL TAMBO              |
| 17                                   | JANUARY | 2007 | 106.44 | CAUCA    | PATÍA                 |
| 17                                   | JANUARY | 2007 | 24.31  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 18                                   | JANUARY | 2007 | 30.22  | CAUCA    | BOLÍVAR               |
| 18                                   | JANUARY | 2007 | 36.97  | GUAVIARE | EL RETORNO            |
| 18                                   | JANUARY | 2007 | 13.87  | CAUCA    | LA VEGA               |
| 18                                   | JANUARY | 2007 | 1.37   | CAUCA    | PATÍA                 |
| 18                                   | JANUARY | 2007 | 26.11  | GUAVIARE | SAN JOSÉ DEL GUAVIARE |
| 18                                   | JANUARY | 2007 | 52.93  | CAUCA    | SUCRE                 |
| TOTAL HA SPRAYED IN THE AUDIT PERIOD |         |      |        |          | 15,903.93 HA          |



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As shown in Table 2, during the audited period a total of 15,903.93 hectares of coca were sprayed in the provinces of Meta, Putumayo, Nariño, Caquetá, Guaviare and Cauca. Image 1 was prepared for greater clarity about the behaviors of spraying operations; the percentage of areas sprayed in each province during the period audited is illustrated.

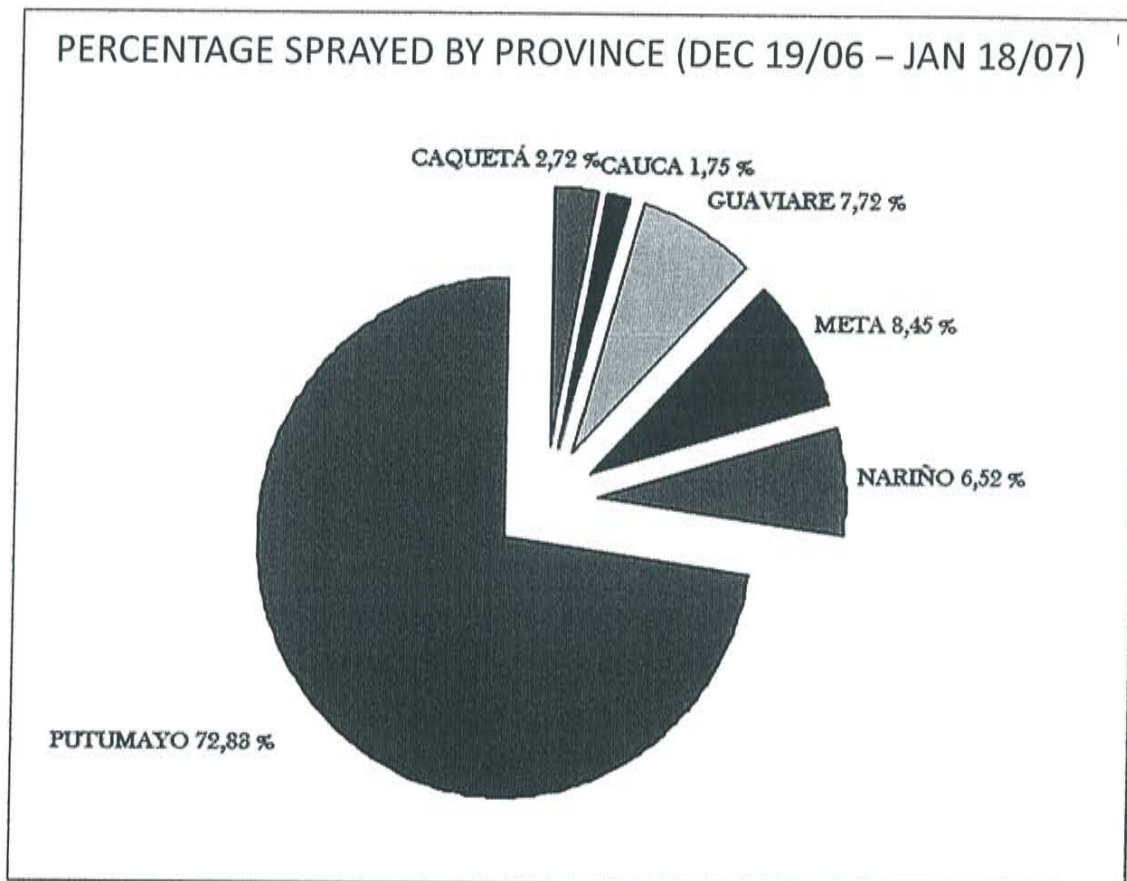
Chart 1 shows that the largest number of hectares sprayed corresponds to 11,583.18 ha (72.83%) in Putumayo. This behavior is mainly due to the fact that the spraying operations of this period had a special emphasis on the eradication of illicit crops in this province, since it is one of the largest coca producers in the country.





Chart 1: Percentage Sprayed by Province

| PROVINCE | AREA (HA) | % SPRAYED |
|----------|-----------|-----------|
| CAQUETA  | 432.14    | 2.72      |
| CAUCA    | 278.43    | 1.75      |
| GUAVIARE | 1,228.24  | 7.72      |
| META     | 1,344.34  | 8.45      |
| NARIÑO   | 1,037.6   | 6.52      |



SOURCE: Spraying performed during the audited period; DIRAN Detection Area



|  |  |                  |
|--|--|------------------|
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In order to understand the behavior of operations during the different periods audited, Table 3 compares the spraying conducted in the period immediately before and those that took place during this period.

Table 3 shows that in the period corresponding to November 19 and December 18, 2006 a total of 11,730.94 ha of coca were sprayed in the provinces of Caquetá, Guaviare, Meta, Nariño, Putumayo and Vichada, unlike the following period from December 19, 2006 to January 18, 2007 where a total of 15,903.93 ha of coca were in the provinces of Caquetá, Guaviare, Meta, Nariño, Putumayo and Cauca. The latter started spraying operations during this period, and as shown in the table, it replaced the operations performed in the province of Vichada.

**Table 3: Comparison of Spraying Operations**

| Period (19 Nov - 18 Dec 2006) |                    | Period (19 Dec 2006 - 18 Jan 2007) |                  |
|-------------------------------|--------------------|------------------------------------|------------------|
| PROVINCE                      | AREA (HA)          | PROVINCE                           | AREA (HA)        |
| CAQUETÁ                       | 627.03             | CAQUETÁ                            | 432.14           |
| GUAVIARE                      | 290.19             | GUAVIARE                           | 1,228.24         |
| META                          | 2,635.37           | META                               | 1,344.34         |
| NARIÑO                        | 301.15             | NARIÑO                             | 1,037.6          |
| PUTUMAYO                      | 4,176.53           | PUTUMAYO                           | 11,583.18        |
| VICHADA                       | 3,700.65           | CAUCA                              | 278.43           |
| <b>TOTAL</b>                  | <b>11,730.9452</b> | <b>TOTAL</b>                       | <b>15,903.93</b> |



SOURCE: Spraying conducted during this period audited and the period immediately preceding, DIRAN Detection Area

#### 6.2.4 Mapping Analyzed

To verify compliance with the spraying operations, the mapping used for this period was reviewed. An example of this mapping is shown in Images 5, 6 and 7 and in shapes that are attached to digital media, in which the behavior of the spraying made in Putumayo could be observed. The following are the findings of the analysis of this mapping:

- It is noted that direction of the spraying lines do not pass through the zones identified in the Environmental Management Plan PECIG (towns, indigenous reservations, national parks and other restrictions), thus fulfilling the required parameters in Record 1 of Resolution 1054 of 2003.
- Some of the spraying lines match the location of illicit crops, but it is worth noting that in areas where there are lines that pass through areas growing no illicit crops, or areas of illicit crops where spraying lines do not cross, are fully justified by the fact that SIMCI screening occurs long before the DIRAN aerial reconnaissance operations are performed. Therefore, this variation can occur by the dynamics of land use since over time: in those

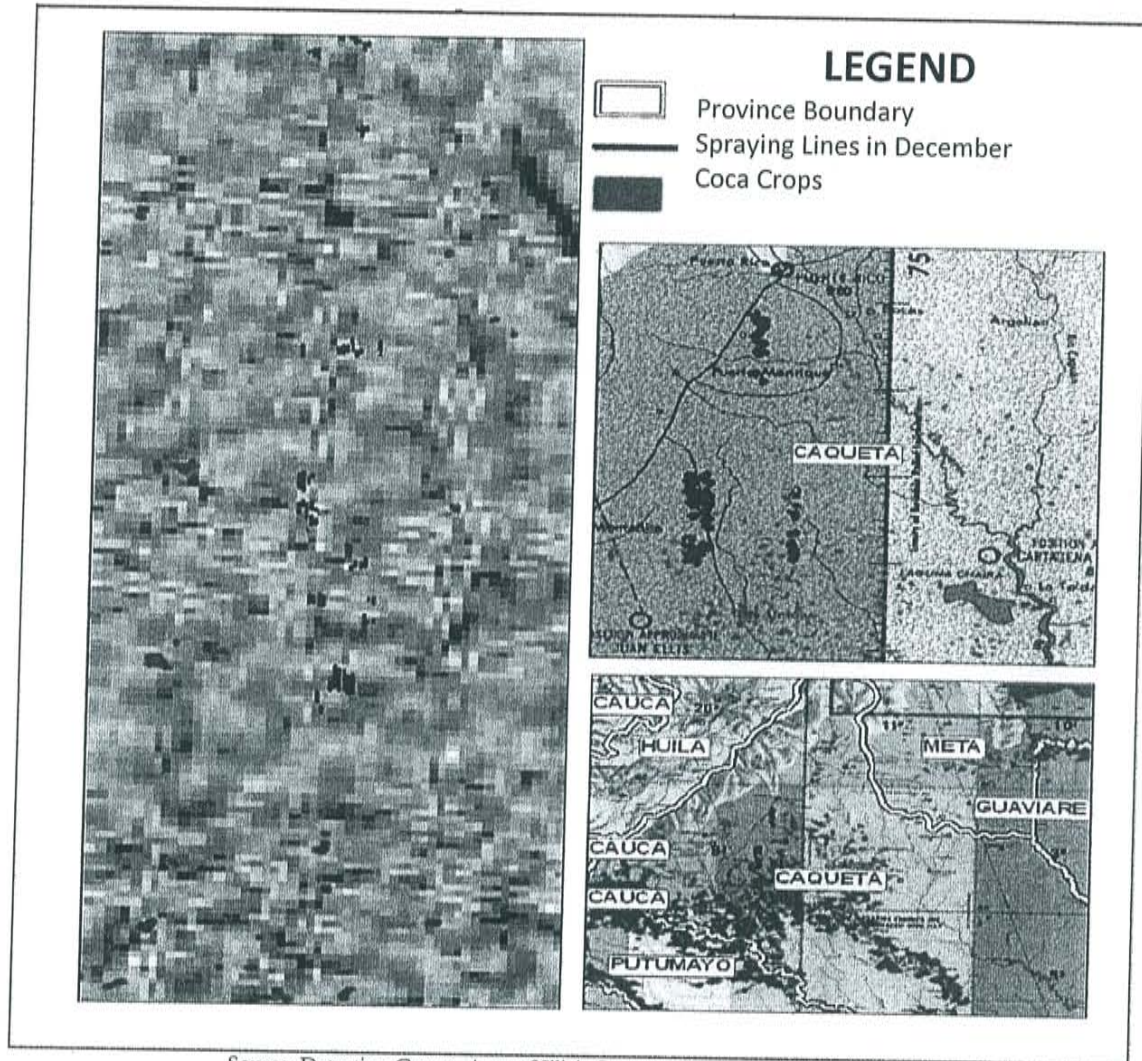


|   |  |   |
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areas where illicit crops had been detected, there may no longer exist any at the time of spraying; or in the areas where illicit crops were not being grown at the time of SIMCI detection may have crops that were planted later.



**Image 5: Display of spraying lines and crops detected in the Satellite Image: Putumayo Province**



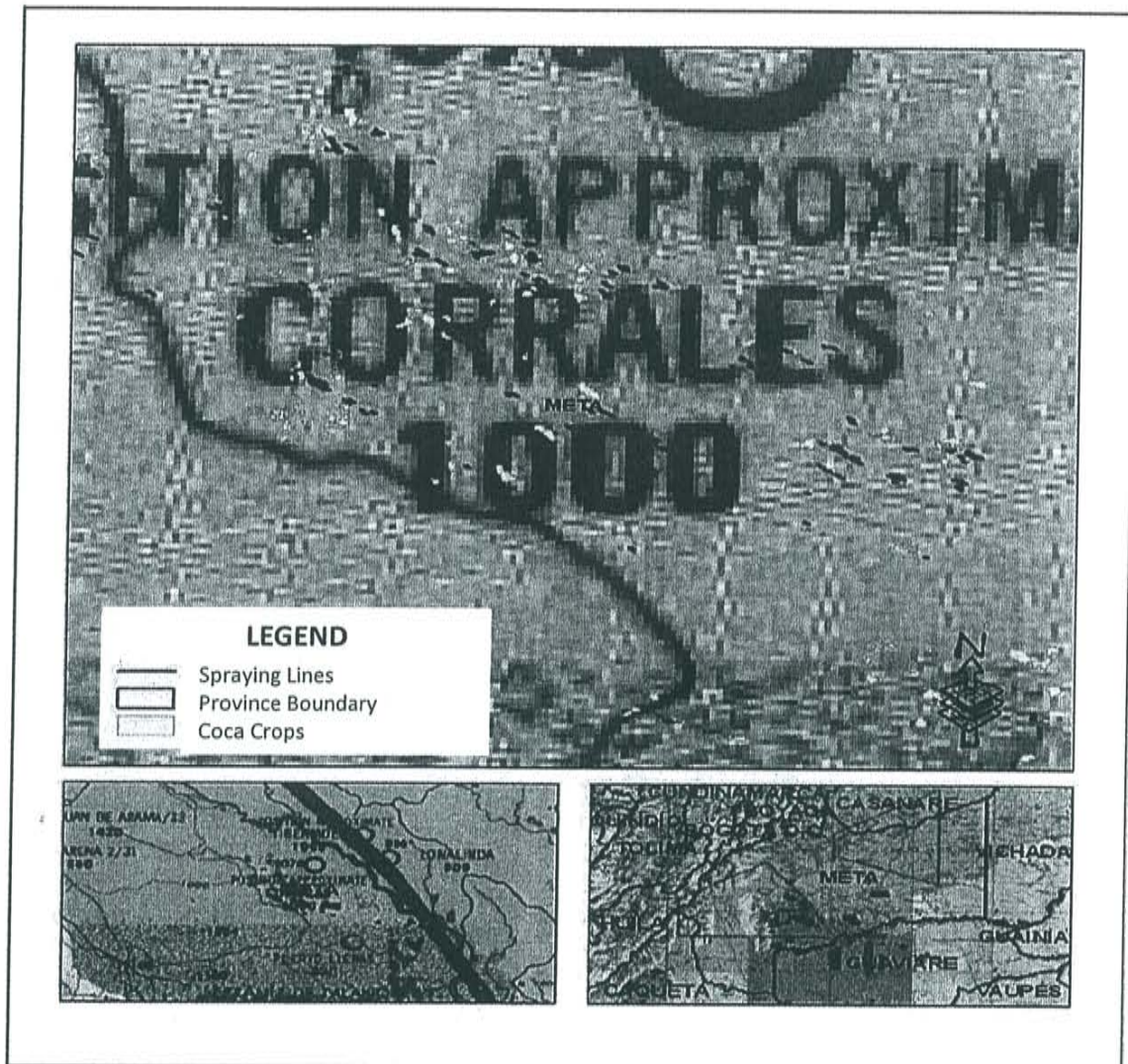
Source: Detection Group, Area of Illicit Crop Eradication - ARECI (DIRAN)

The image above shows the spraying lines in red and the illicit crops in green, illustrating that there are some areas where the two parameters do not match. The justification for this fact is explained in the preceding paragraph and it refers to the difference in SIMCI detection time, DIRAN aerial reconnaissance and the time of spraying.





Image 6: Display of spraying lines and crops detected in the Satellite Image: Meta Province



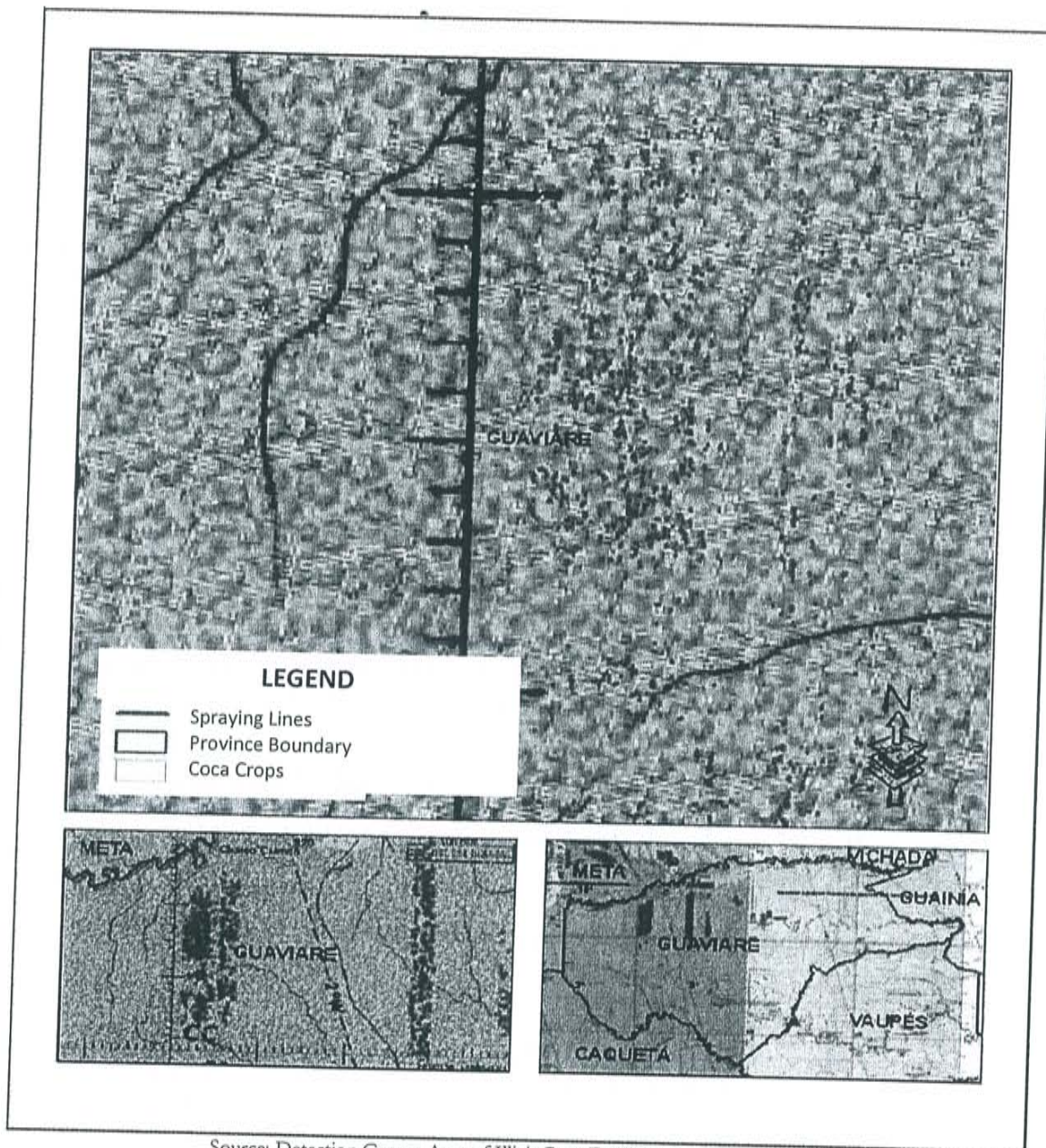
Source: Detection Group, Area of Illicit Crop Eradication - ARECI (DIRAN)

The image above shows the spraying lines in red, the coca in yellow polygons and the province boundaries in purple lines.







**Image 7: Display of spraying lines and crops detected in the Satellite Image: Guaviare Province**



Source: Detection Group, Area of Illicit Crop Eradication - ARECI (DIRAN)

The image above shows the spraying lines performed in the province of Guaviare in red and the coca crops in yellow polygons.



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### 6.2.5 Audit Findings

Since it was demonstrated that the procedures used to perform the spraying operations met the requirements of the Environmental Management Plan set forth in Record number 1, the audit had no findings in this period.

### 6.2.6 Audit Conclusions

In analyzing the data used for the spraying operations of this period, the audit identified that the following parameters are being taken into account:

- The geographic coordinates of the plots to eradicate
- The organization and registration of all spraying operations that are performed, as shown in Table 3, Images 5, 6 and 7 and in shapes that are attached in the magnetic media
- Environmental zoning has been established for all areas of influence
- The preventive measures and operational parameters required by the spraying operations are taken into account

The above leads to the conclusion that the spraying operations conducted during the period audited comply with the specifications of the Record 1 of the Environmental Management Plan (Resolution 1054 of 2003).



### 6.2.7 Audit Recommendations

Based on the analysis of information related to the activities undertaken in regard to spraying operations, the Audit recommends that this process continue to develop as it has done so far.

### 6.3 Verification Stage

During this period there were no field verifications, so the Audit did not undertake any activity in this regard.



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## 7. FOLLOW-UP AUDIT OF THE ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan covers all activities related to the implementation of PECIG in the country. This chapter shows the results of the audit of compliance in the implementation of the plan on issues related to Prevention, mitigation and compensation measures included in the Records of the current environmental management plan (Resolution 1054 of 2003 MAVDT). The basis of this report is represented by the data collected in the field and that was generated by those responsible for the execution of each Record in the period audited.

### Record No. 2: Industrial Security Program in the PECIG Operating Bases

For this period, the Audit of Record 2 was performed on the Mobile Operations Base of Popayan. Activities audited were:

- Management of agrochemicals
- Management of supplies and equipment
- Occupational health and safety measures
- Signage
- Training

Issues relating to the management of solid waste from agrochemicals, fuels and lubricants are listed in the Audit of Record 3 of the Environmental Management Plan in this report.



### Management of Agrochemicals

#### *Glyphosate storage*

Considering that the conditions in which such substance is stored must obey certain rules to prevent accidents of any kind, the Audit verified that these conditions are taken into account in the Mobile Operations Base in Popayan. For greater clarity about these conditions, please refer to Image 8 and the description below:

- **Floor:** It is an earth floor, the chemicals are placed on a waterproof tarp, which in turn is mounted on wooden pallets.
- **Roof:** The storage area has no roof, which is why it is exposed to the direct effects of sun, rain and wind.
- **Retaining Wall:** The spill retaining wall is a plastic system on which the bins are located, according to interviews with those responsible for the environmental management plan at the Base and the DIRAN. This system ensures containment of spills, but during the visit,

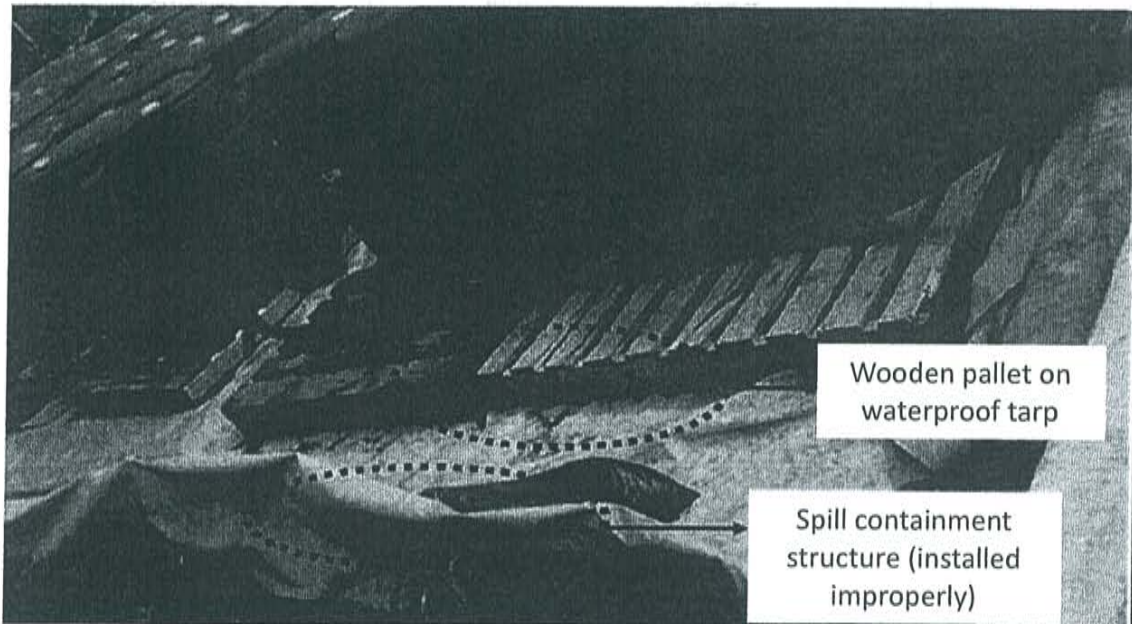


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the Audit found that it had not been properly installed and is likely to turn sideways; and if there were a spill, it would not be contained within the system.

- **Order of the area:** The drums are properly organized.

**Image 8: Glyphosate Storage Area**





### *Cosmoflux Storage*

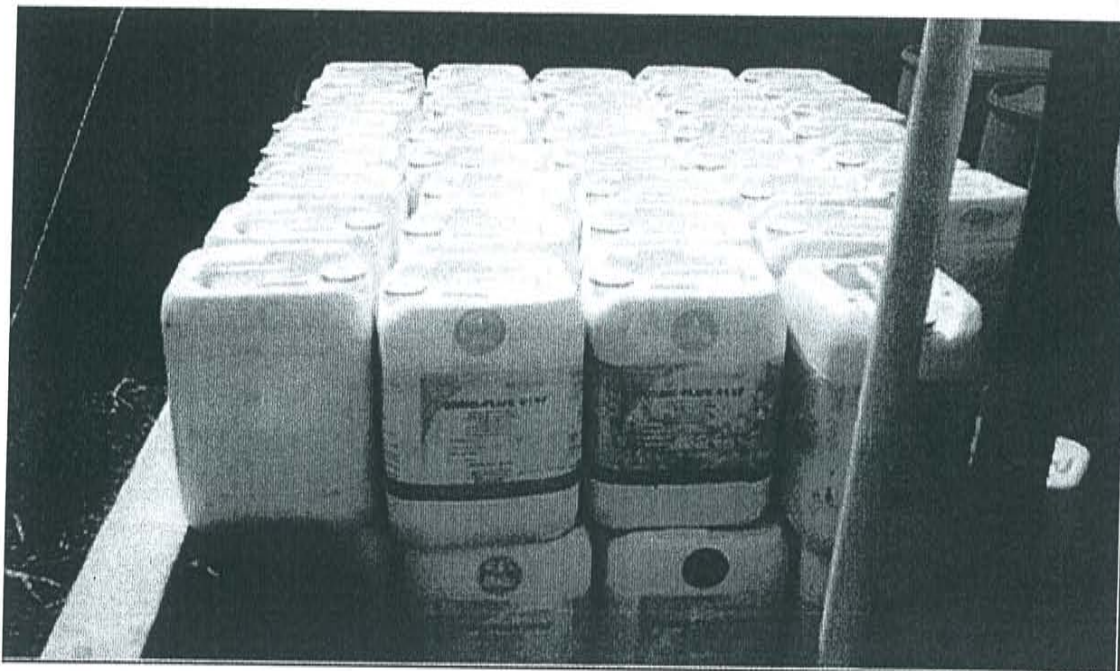
Given that Cosmoflux adjuvant must be stored in conditions similar to those used for the glyphosate, the audit noted that the storage area of this substance has the following conditions (See Image 9):

- Concrete floor
- Perimeter retaining wall
- The only unfavorable matter the Audit found in this area was the absence of a roof, which is why the chemical is exposed to direct sunlight, rain and wind.



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**Image 9: Cosmoflux Storage**





Given the chemical composition of these substances, the audit verifies that the necessary handling measures were met in order to avoid incidents on the technicians who handle the chemicals. The visit confirmed that the technicians make use of:

- Protective mask
- Gloves
- Apron
- Coveralls
- Boots
- Goggles

As regards the loading of the mixture to the spraying planes, it was noted that this is done under the right conditions to ensure proper handling of the herbicide.

The application of agrochemicals is done by aerial spraying, in appropriate aircraft, equipped with spraying devices of adequate conditions to perform this work and which ensure operational parameters such as: droplet size, maximum flight altitude, ambient temperature, speed and wind direction, among others.



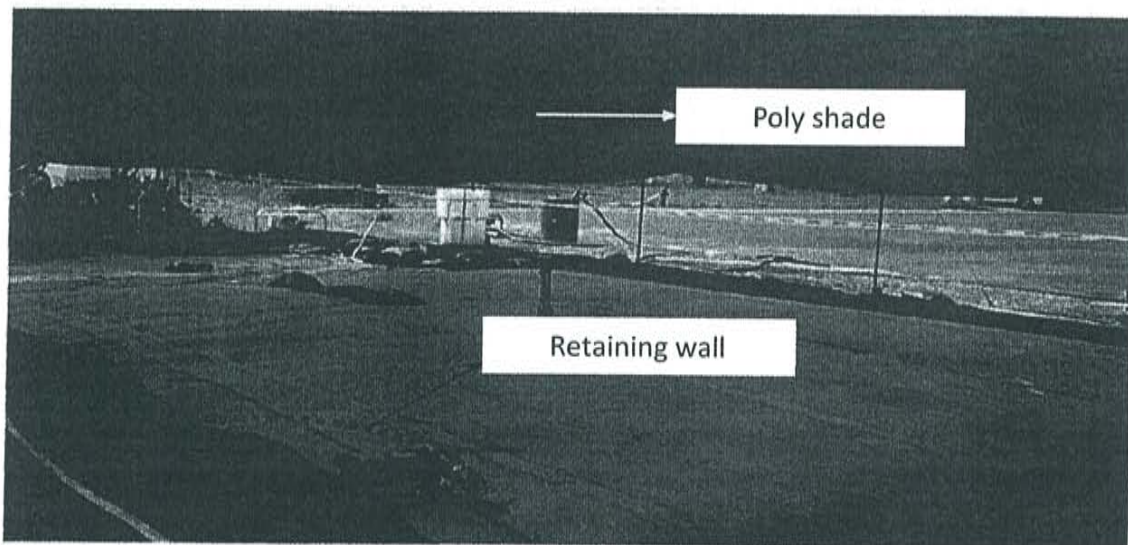
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## Handling of Supplies and Equipment

### *Fuels and lubricants*

Requirements for storage of fuels and lubricants are specified in the Colombian Technical Standards: 1899, 1417, 4643, 5011 relating to the handling, storage and transportation of fuels and lubricants. Based on the visit to Popayan, the Audit verified that some of these requirements have not been met, since, as shown in Image 10, for the fuel storage, a poly shade has been implemented; it serves as a cover for the stored fuel and it avoids direct contact of the sun. However, similar to the storage of agrochemicals, it is noted that the spill containment wall is rather weak. It is recommended that this wall be reinforced to avoid any contingencies that might arise.

**Image 10: Fuel Storage**





Matters relating to the handling and transport of these substances are conducted under the conditions necessary for this activity. The type of fuel received, the quality and quantity of it and the way it was carried to the base is verified.

In regard to the safety standards required to handle such substances, the Audit verified that the necessary procedures are followed to avoid any incidents.

### **Management of Aircraft, Land Vehicles, Equipment and Machinery**

The mixture of glyphosate, Cosmoflux and water used for aerial eradication of illicit crops is prepared in equipment as shown in Image 11. This equipment receives regular maintenance to identify leaks or malfunctions of the system. During a visit to the base it was observed that after



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conducting the review no abnormality was demonstrated in the functioning of this equipment.

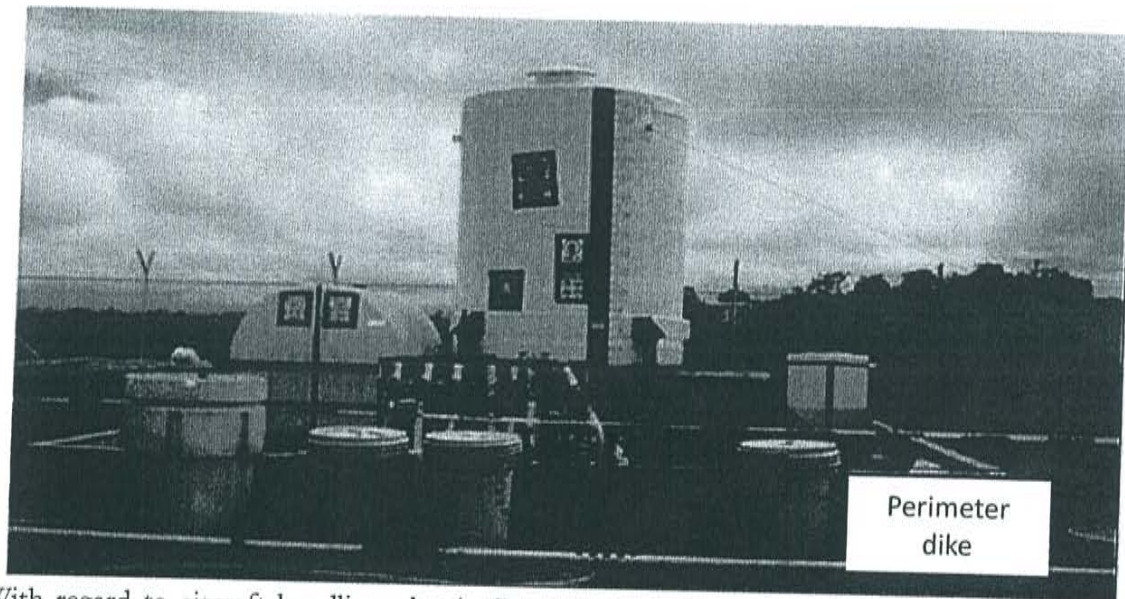
The equipment is located in an area built in concrete, which also has a side wall to contain spills.

This same area also lodges the equipment used to triple wash the chemical drums that have been vacated (see Image 11); this process allows permanent recirculation of the wash water and its reuse in the mixture, which decreases generation of volumes of wastewater and minimizes its impact.

The side retaining wall, mentioned above, can reduce the risk of spills of wash water with chemical residues and prevents spillage into the ground and surface water bodies near the Base.

Based on conditions observed in the field visit, the audit could determine that the handling of equipment at the base of Popayan is done properly.

**Image 11: Mixing Equipment**





With regard to aircraft handling, the Audit verified that they were in good condition and that DYNCORP and DIRAN technicians perform daily calibration and maintenance to determine the status of aircraft and repair them before spraying, if this is necessary.

### **Occupational Health and Industrial Safety Measures**

Occupational health measures are mainly aimed at preventing any incident that causes changes in the health of the technicians who handle the agrochemicals or contingencies that involve environmental hazards in the area where the Base is located. In order to verify the



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implementation of these measures, the Audit found that the Operations Base in Popayan has:

- **Personal Protective Equipment:** As shown in Image 12, the personnel handling chemicals makes proper use of personal protective equipment which includes: protective masks, face masks, gloves, apron.
- **Kit for handling of spills:** Image 13 shows the white container bearing the KIT for the handling of spills.
- **Fire-fighting equipment:** the visit allowed demonstrating that each of the areas of the Base has fire fighting equipment; fire extinguishers are a fundamental part as seen in Image 14.

**Image 12: Personal Protective Equipment**

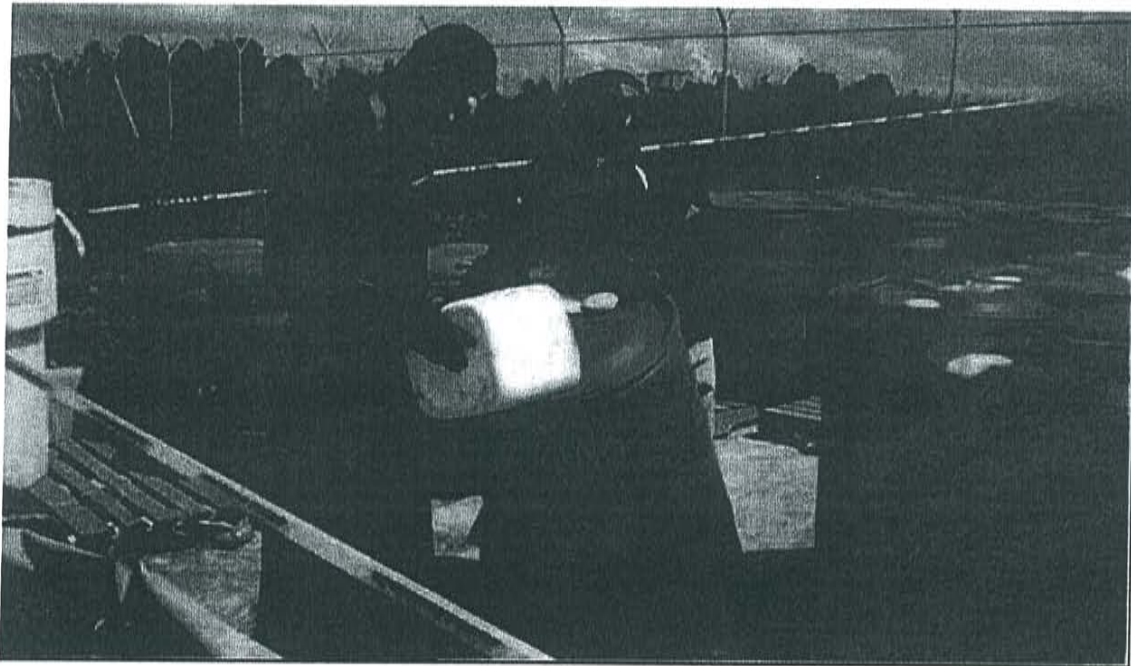




Image 13: Kit for the handling of spills

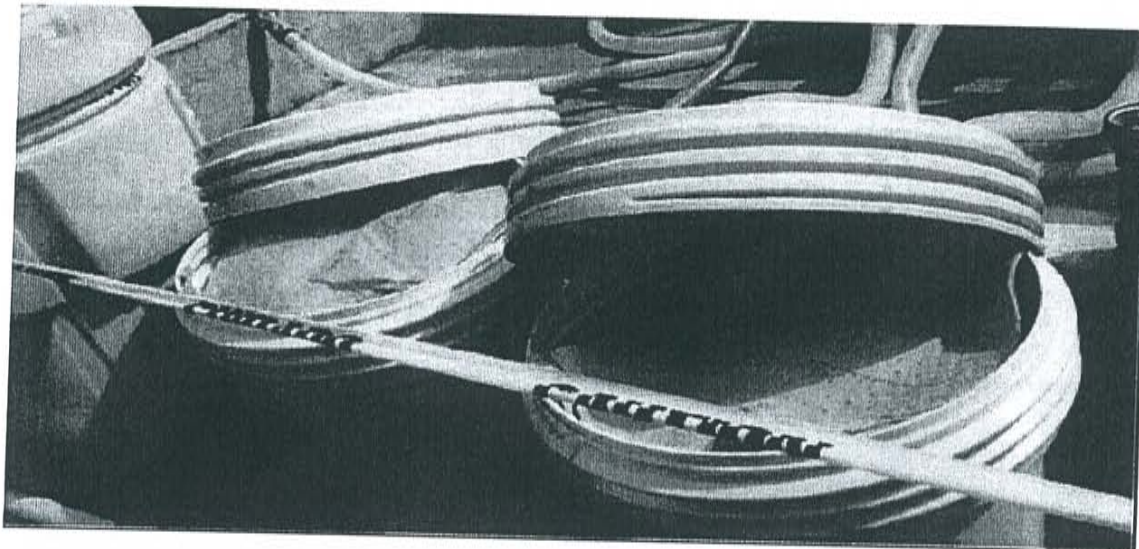




Image 14: Fire Extinguisher



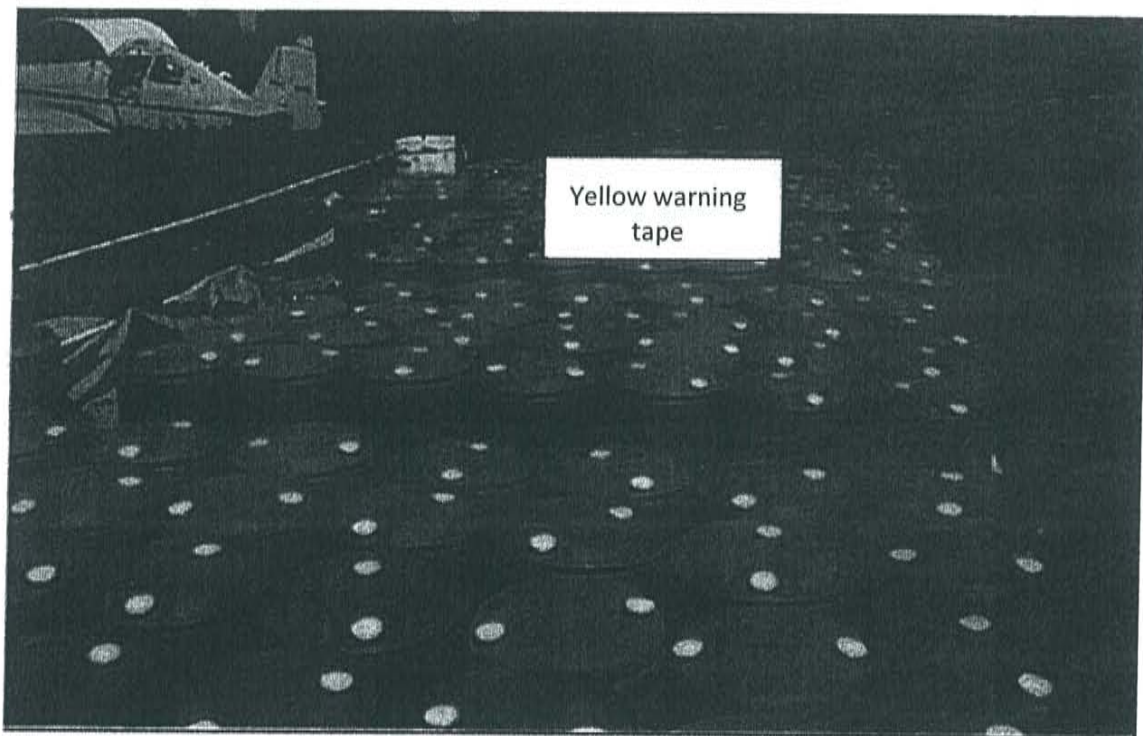
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### Signage

Signage Pictograms are critical at the moment required to prevent incidents in the different areas of the Base; for this reason during the visit, the Audit noted that signage pictograms that have been implemented are not suitable. For example, Image 15 shows that the signage for the storage of agrochemicals is a yellow ribbon that does not indicate the kind of substance stored there and which measures should be considered when entering these areas.

However, there were some appropriate signage pictograms in the mixing zone which indicated the necessary precautions in these areas.



**Image 15: Signage of the Agrochemical Storage Area**



### Training

Since the Popayán mobile base has just been installed, there has not been any semiannual or annual training. However, by reviewing the reports, it was possible to conclude that the necessary staff is informed of the conditions that must be met for proper handling of the agrochemicals, as well as the industrial safety standards to be taken into account in the different areas of the Base. Likewise, the different responsibilities to perform such activities were delegated to the staff that will work during the period.



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### Audit Findings

After the visit to the Popayan Base, the Audit presented the following findings:

- The floor of the storage area of chemicals, fuels and lubricants does not meet the required parameters for the storage of such substances.
- The agrochemical storage area has no roof, which exposes them directly to the sun, rain and wind. The most harmful effect of this breach is that the chemicals can come into direct contact with rain water and could thus lead to contamination of soil or water bodies near the base.
- The perimeter spill containment walls are not properly installed; in the event of a spill, this could cause contamination of soil and water sources near the base.
- Signage is very poor, it only consists of a yellow ribbon around the place of storage of agrochemicals. Also, the pictograms installed are not sufficient and are not located in visible places, which does not allow distinguishing the type of procedure performed in each area and the precautions to be taken upon entry.

### Audit Conclusions

After analyzing the information gathered, the Audit concluded that the Popayán Operations Base produced some shortcomings with regard to storage of chemicals, fuels and lubricants, as well as aspects related to signage of the different areas of the Base.

Moreover, the Audit acknowledges that this is a Mobile Base and the conditions in which it is managed should not impose too high costs or sophisticated structures; however, the installation conditions of the Base must be improved in order to prevent incidents.

### Audit Recommendations

The Audit recommends in the first instance, that the DIRAN take account that despite having the condition of Mobile Base a critical factor such as the proper storage of chemicals cannot be ignored. Secondly it is recommended that:

- The floor of the agrochemical storage area, if not built in concrete, must be coated more properly to avoid direct contact of the bins with the soil and potential problems of infiltration and subsequent contamination of the soil.
- The agrochemical storage area should have a roof, which can be similar to the poly shade installed for the fuels and lubricants; its main purpose is to protect the glyphosate bins.
- Care must be taken when installing the side retaining walls because if a spill of chemicals, fuels and/or lubricants occurs, this structure must be able to withstand it and prevent contamination of water or soil in the area.



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- The signage of the different areas must be adequate, with pictographs located strategically in order to clearly identify each area and the precautions to be taken upon entering each.

### **Record No. 3: The Solid Waste Management Program in PECIG Operating Bases**

This Record contains the minimum requirements that must be considered in regard to handling and disposal of solid waste on the PECIG Operating Bases.

These requirements are drafted based on the following legislation: Decree 2104 of July 26, 1983, which regulates the management of domestic solid waste, Law 430 of 1991 establishing prohibitive environmental rules, relating to waste hazardous and other provisions, Decree 2104 of July 1983: Partially regulating Title III of Part IV of Book I of Decree - Law 2811 of 1974 and Title I and Title XI of Act 9 of 1979 as per solid waste, Resolution 2309 of 1986, as per special waste, Decree 1843 of 1991, regulating special solid waste and solid waste related to the handling of agrochemicals.

Considering these aspects, the Audit has based its analysis on the verification of aspects referring to: identification of the origin of waste, characterization and quantification of the same, proper storage and final disposal, training programs on waste management, to be implemented in the Popayán Operating Base.

#### **Origin and Nature of the Solid Waste**



Considering that at the time of the visit the Base had just been installed, it still did not have records of the solid waste generated; however, it was observed that these are classified and quantified at the end of each day.

#### ***Final Domestic Waste Disposal***

Containers were found for the final disposal of solid waste similar to those in Image 16. The drums are in good condition but they lack appropriate signage pictograms.

On the other hand, as is also seen in Image 16, the final disposal of organic waste has no lid, which could cause odors and the presence of vectors.



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**Image 16: System of Final Domestic Waste Disposal**



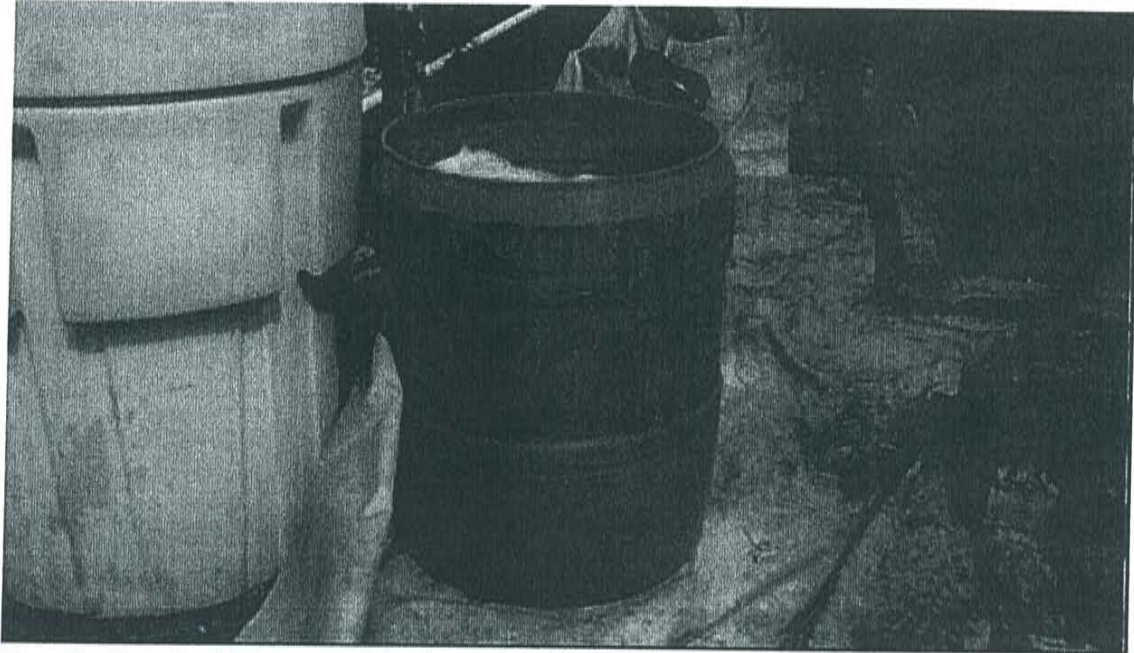
*Final Special Solid Waste Disposal*

Image 17 shows the storage of hazardous waste. As can be seen, the drum has no lid, which is a factor that does not allow ensuring that the residues remain in the container and which may cause the presence of vectors. It was also noted that the signage pictogram used is not appropriate for these cases.



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**Image 17: Special Waste Storage**



Since the Base had been established just days before the visit, the glyphosate bins generated have been used as waste disposal systems; for this reason their storage could not be observed.

### **Training**



Since the Popayan Mobile Base has just been installed, there has been no semiannual or annual training. However, by reviewing the reports it can be concluded that the necessary staff has been informed on how to dispose of the waste generated, how to classify them and what characteristics their storage should have. Likewise, the different responsibilities to perform such activities were delegated to the staff that will work during the period.

### **Audit Findings**

After auditing the aspects of Record 3 of the Environmental Management Plan, the Audit found the following:

- The final disposal of organic waste has no lid, this can cause odors and the presence of vectors; also the drums do not have the appropriate signage pictograms.
- The special solid waste storage is done in an uncovered container that does not guarantee that the waste will remain in the container; it can also cause the presence of vectors.



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### **Audit Recommendations**

Given the findings, the Audit recommends:

- That the bins that are used to deposit domestic and special solid waste have the appropriate cover to avoid the presence of vectors and therefore ensure their safe storage.
- The signage of the bins must have visible characters that identify their contents and the corresponding symbol for the type of waste.

### **Audit Conclusions**

As shown in the results of the Audit of Record 3 of the Environmental Management Plan, the Popayán Operations Base has not meet the following requirements:

- Special and Domestic Waste Containers have no lids.
- The characteristics of the signage pictograms of the bins are not adequate.

### **Record No. 4: Program for Handling Wastewater in the PECIG Operating Bases**

The Audit of the management aspects of wastewater at the Popayán Operating Base is performed taking into account the requirements of the Record 4 of the Environmental Management Plan.

Considering that the base is mobile and does not generate waste water, the activities audited were: Industrial Wastewater Management (washing of aircraft and spraying equipment), final disposal, and training.



### ***Wastewater Management***

#### **Wastewater Treatment**

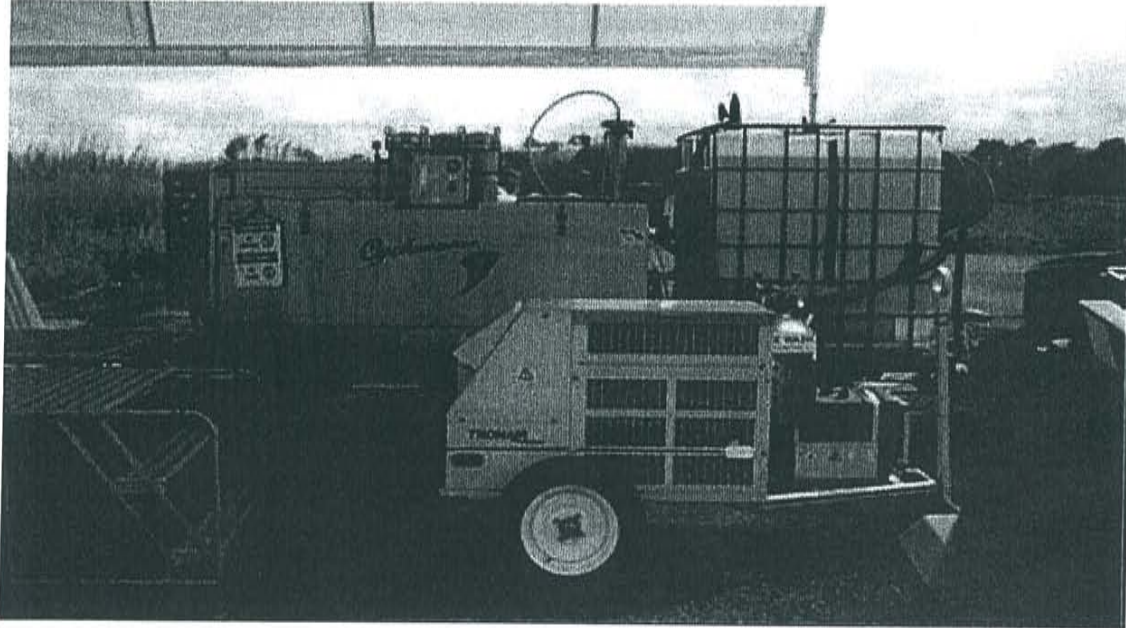
Industrial wastewater generated in the Base comes from the washing of aircraft. These waters are treated in a mobile plant that can be observed in detail in Image 18. This plant receives water from the washing of the aircraft through a waterproof covering on which the aircraft is located. This covering captures the water from the washing process and leads it to the ground via a circulation system.

In making the visit to the Base it was observed that the washing process is done properly; in addition it was confirmed that the effluent from this plant is reused for spraying operations.



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**Image 18: Treatment Plant for Industrial Liquid Waste from Washing the Aircraft**



### *Final Disposal*

The effluent from the treatment plant for liquid waste from the washing of aircraft is reused for spraying operations.

### *Training*

Since the Popayán Mobile Base has just been installed, they have not conducted semiannual or annual training. However, by reviewing the reports and after a visit to the Base it can be concluded that the necessary staff has been informed on the operation of the treatment plant.

### *Audit Findings*



In relation to the Record 4 of the Environmental Management Plan, the Audit identified no findings of noncompliance for this period.

### *Audit Conclusions*

The audit concludes that the Popayán Operations Base meets all requirements of the Record 4 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT) in relation to the treatment and disposal of industrial wastewater.





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### *Audit Recommendations*

Given that all requirements of the Record 4 have been complied with, the audit recommends that aspects of this Record continue being handled as has been done so far.

#### **Record No. 5: Environmental Monitoring Program.**

Audit Record No. 5 of the Environmental Management Plan will be made according to the requirements and procedures set forth therein, as follows: Analysis of plant succession (taking into account selected plot size, number of plots sampled, frequency of monitoring), Analysis of glyphosate and AMPA (selected plot size, number of plots sampled, frequency of monitoring), taking into account the following indicators: laboratory soil samples (pH, cation exchange capacity (CEC), ratio of exchangeable bases, nitrification (nitrates, ammonium and nitrites), percentage of organic matter, texture, concentration of glyphosate and AMPA, bacteria count, fungi, actinomycetes and nitrogen fixing, phosphate solubilizing, total and available phosphorus) and water (concentration of glyphosate and AMPA, pH, electrical conductivity, temperature, dissolved oxygen, chemical demand for oxygen, nitrification (nitrates, nitrites and ammonium ), dissolved phosphate, magnesium and calcium).

#### *The procedure used during the monitoring*

During the audited period planned monitoring was performed and developed by the Anti-Narcotics Police, the Putumayo – Caqueta Nucleus, in order to determine the presence of glyphosate and AMPA in soils and water.

The Audit participated in this monitoring in the role of observer of this activity; it then presents a report on the activities undertaken around the collection of samples for subsequent analysis.

#### *Plot Features*

##### *Plot Size*

The size of the plots was selected according to the information specified in Record 5 of the Environmental Management Plan, as follows:

- Plot 1: 1 hectare
- Plot 2: 1.5 hectares

##### *Number of plots*

The sample was taken from two different plots in the Putumayo – Caqueta nucleus, in the Putumayo province. The following describes in more detail the characteristics of each plot, as observed in the field visit:



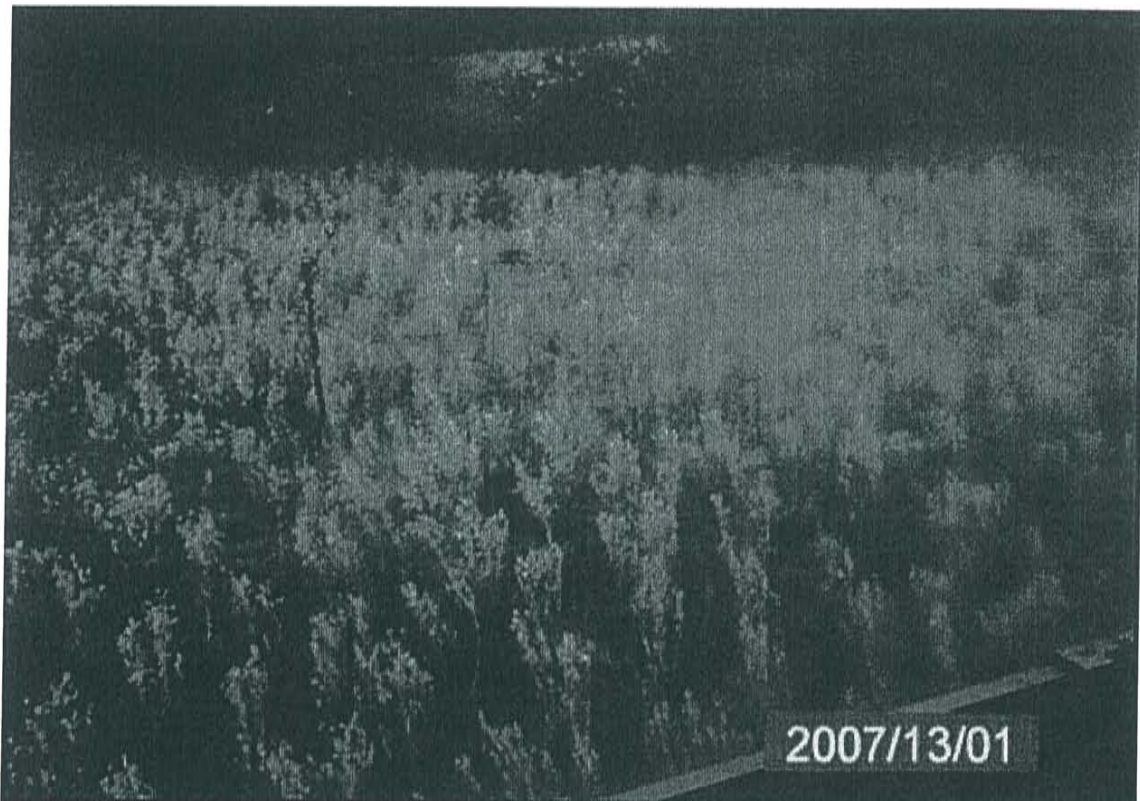
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PLOT # 1

Coordinates: North: 01° - 00' - 14.34"  
 East: 75° - 38 - 51”

Image 19 shows a coca cultivation in plot 1; it also shows that the leaves are pale due to the affliction from the strength of the wind driven by the helicopter propeller that exposes the underside of the leaves. As seen in the visit and as shown in the bottom of the image, the terrain is flat and it is located at the foot of a hill; also the physical characteristics of the soil (color, texture), topography and vegetation cover of the environment, make this area representative of the nucleus to be evaluated.

**Image 19: First View of plot No. 1**







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Image 20 shows another view of the same plot: here it clearly shows the crop density and plant size in most of the field; to determine this parameter, the height of the Trooper, observed in the right side of the image, was taken as a reference.

**Image 20: Second Take of Plot 1**



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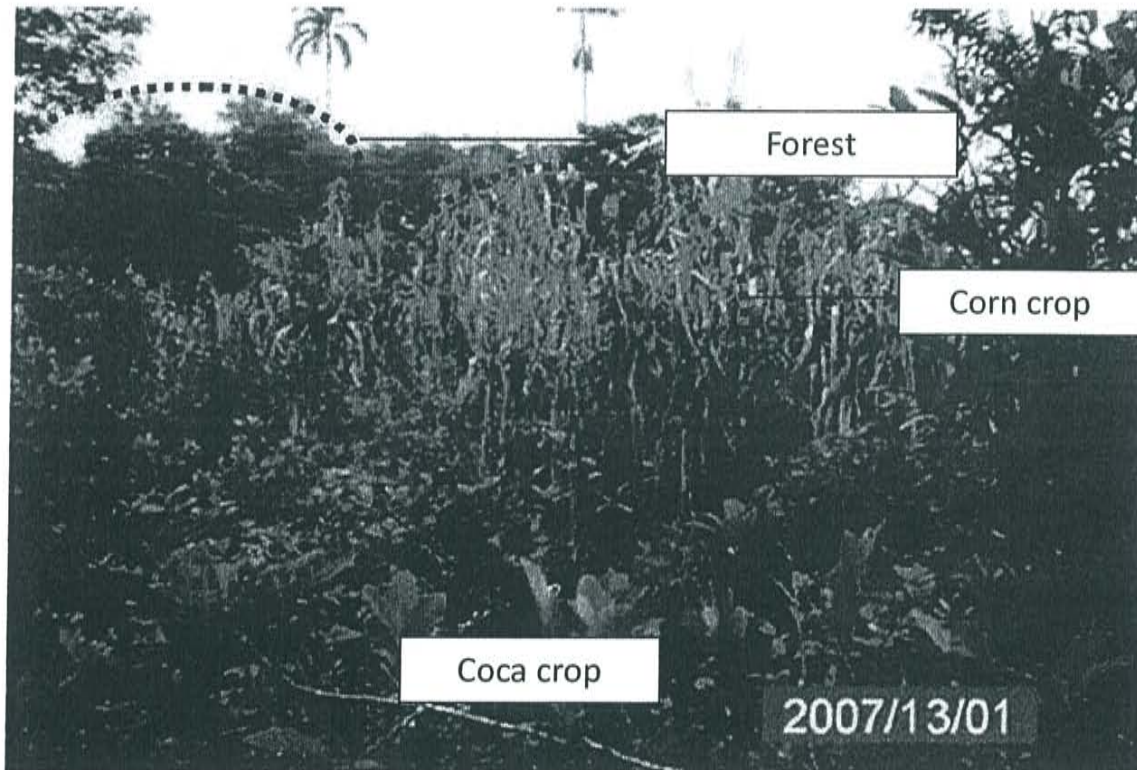
- **Plot No. 2:**



Coordinates: North: 01° - 00' - 21.48"  
East: 76° - 38' - 57.42"

Since plots 1 and 2 are relatively close, they have the same characteristics, which enables identifying plot 2 as equally representative of the nucleus evaluated.

The central part of Image 21 shows that the illicit crop was intercropped with maize and banana plants and situated next to a forest typical of the region, which can be seen in the background of the image. If one takes into consideration the height of the corn plants, it follows that coca cultivation can be about 1.40 m.

**Image 21: Plot 2 Features**



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*Sampling*

The taking of samples for glyphosate and AMPA analysis was made taking into account the respective procedure, as described below:

- *Soil*



For soils, a sample was formed from a composite of three (3) sub-samples taken from each plot from which the first 20 cm. of A horizon at the selected site is extracted, mixing the subsamples and placing them in duly identified bags.

Images 22 and 23 show the taking of a sample of soil according to the protocol described in the preceding paragraph. This was performed by ICA and MAVDT technicians and DIRAN patrol officers who accompanied the visit.

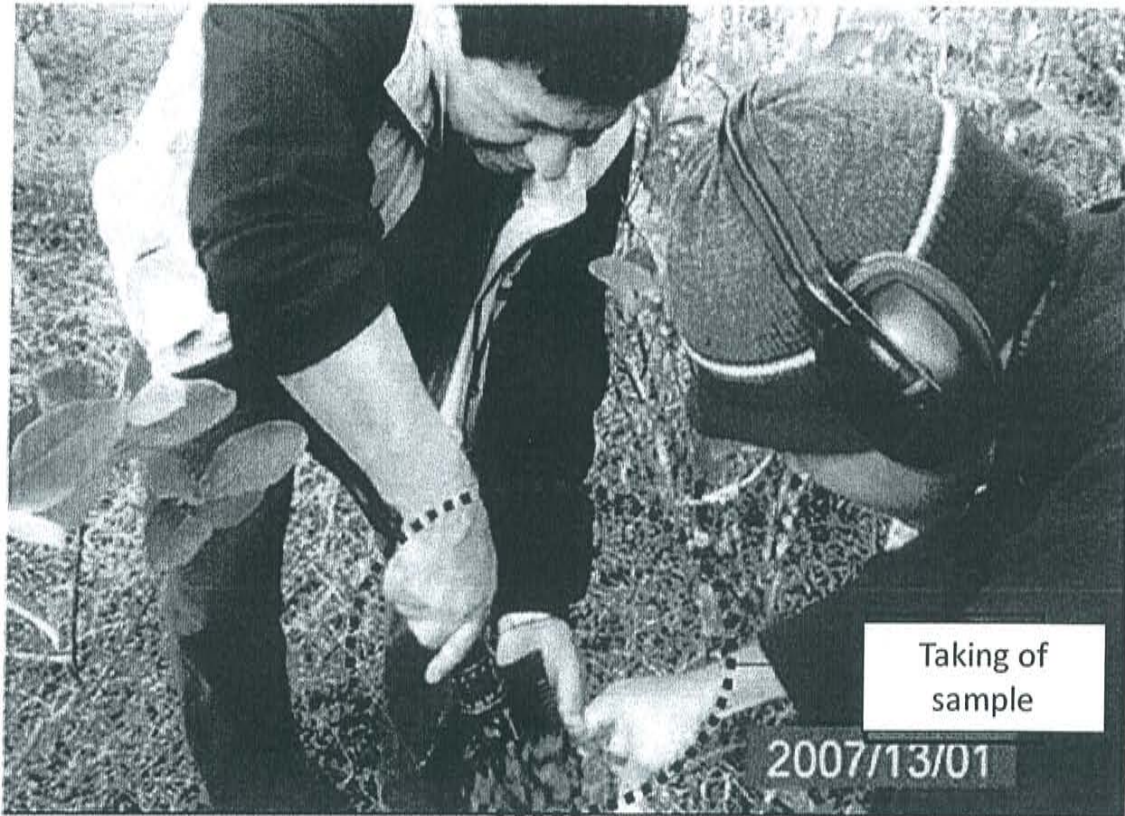
This operation was performed before and after spraying, in obedience to the requirements of Record 5 of the Environmental Management Plan (Resolution 1054 of 2003).

**Image 22: Taking of soil samples: Plot 1**



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**Image 23: Soil Sampling on Plot 2**





- *Water:*

To take the water sample, a sample was formed from two (2) takes in each plot; these are collected in suitable containers made of polyethylene which are properly identified according to the protocol.

Image 24 shows one of the technicians taking the water sample in the plot 2; this was taken under the parameters set out in Resolution 1054 of 2003.



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**Image 24: Taking of Water Sample**



### *Sample Analysis*

#### *Residues of glyphosate and AMPA and Indicators:*

Since the lab results of samples taken have not been delivered, the Audit will present this analysis for future periods.



#### *Analysis of plant succession*

Given that monitoring has just been completed, the Audit will monitor the analysis of plant succession made for this period.

### *Monitoring Frequency*

The monitoring was performed before and immediately after spraying, and it was conducted under the following procedure: the commission traveled by helicopter of the National Police to the selected plots; prior to spraying and once appropriate security measures were taken, the commission descended to the plot and proceeded to collect the respective samples of water and soil; then the members of the commission take shelter and the aircraft proceed to effect the



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application of herbicide. Once the spraying is ended, they again collect soil and water samples from each of the plots.

Since this report presents the monitoring before and after spraying, the Audit will strive for the monitoring to be performed at 30, 60, 90 or 180 days, according to the results of laboratory tests.

### *Audit Findings*

After participating in the field visit for monitoring in the province of Putumayo and taking into account that the lab results are not yet ready, the audit has no findings in regard to the selection of plots, the initial frequency and the sampling for this period.

### *Audit Recommendations*

The audit recommends continuance of the implementation of the current procedure for the selection of plots, taking of samples and sampling frequency as has been followed so far.

### *Audit Conclusions*

Since no findings were identified for the activities audited, the Audit concluded that they meet the standards established in RECORD 5 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT) in regard to the selection of plots, initial frequency and the sampling for this period.

## **Record No. 6: Communication and Social Management Program**

According to the requirements of Record 6 of the Environmental Management Plan, the Audit verified that all the procedures that the resolution requires were performed. This Audit relates to the activities in the month of December 2006.

### *Communication*

This Audit was conducted based on reports generated by the DNE, in this way it was possible to verify that the following communication activities took place:

- Flyer: Avoid Having Your Farm Forfeited (website, printed)
- Areas of illicit crops in National Nature Parks (National Parks)



### *Training*

The training activities conducted during the audited period were related to the meeting of:

- The Sectional Narcotics Council of Bolivar





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### *Interagency Coordination*

In relation to interagency coordination, the DNE has developed the following activity during the audited period:

- Development of the Interagency Technical Committee

### *Audit Findings*

Given that the DNE has implemented all the activities required by Record 6 of the Environmental Management Plan, the Audit had no findings for this period.

### *Audit Recommendations*

Given that findings were not detected in this period, the Audit recommends continuance of implementation of the training, interagency communication and coordination in the way they have done so far.

### *Audit Conclusions*

Since there were no findings of noncompliance for this period, the audit concluded that the DNE has implemented all the requirements of RECORD 6 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT).



## **Record 7: Public Health Program**

With regard to the activities and procedures aimed at prevention, mitigation, correction and compensation of risk situations for the health of the population in the areas of PECIG operation, the Audit verified compliance with activities required by Record 7 of the Environmental Management Plan for the month of December 2006.

### *Audit Observations*

In the framework of the development of the training programs, the INS has trained over 1000 sanitarians, health workers, UMATA and ICA officials as facilitators under the SARAR educational methodology. Of all the facilitators prepared by the INS, 199 staff were trained in December 2006, as shown in the following table:



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**Table 4: Records of staff trained in the month of December 2006**

| Date          | Province  | Sanitation technicians and rural health promoters |
|---------------|-----------|---|
| 1-2 Dec -06   | VAUPES    | 17  |
| 7 - 9 Dec -06 | PUTUMAYO  | 44  |
| 4 – 7 Dec -06 | RISARALDA | 58  |
| 11 - 15 Dec   | CALDAS    | 80  |
| <b>TOTAL</b>  |           | <b>199</b>  |

Source: Activity Report December 2006, INS

The objective of training the facilitators is that they be responsible for disclosing in their community the knowledge acquired during these days. Also, the INS has the ability to continually track these people to confirm that trainings are conducted in all communities.

To complement the training activities, the INS has developed and delivered guides and posters. The listing of the delivery of this material in the audited period is presented in Table 5.

**Table 5: Material distributed under the methodology SARAR**

| Date           | Place     | Posters    | Facilitator Guides | Visitor Guides |
|----------------|-----------|------------|--------------------|----------------|
| 4 Dec 06       | RISARALDA | 100        | 70                 | 140            |
| 11 Dec 06      | CALDAS    | 200        | 70                 | 280            |
| <b>TOTALES</b> |           | <b>300</b> | <b>140</b>         | <b>420</b>     |

Source: Activity Report December of 2006, INS

In addition to the above activities, the INS conducts activities in the field of epidemiological surveillance of acute pesticide poisoning. In the audited period technical assistance activities were performed in Tolima, as shown in Table 6.

**Table 6: Technical Assistance to provinces in the month of December 2006**

| PROVINCE | DATE              |
|----------|-------------------|
| TOLIMA   | 6 - 7 December 06 |

Source: Activity Report December of 2006, INS



### *Audit Findings*

After review and analysis of information related to the implementation of the Record 7 of the Environmental Management Plan, the Audit finds no non-compliance determined for this period.

### *Audit Conclusions*

In relation to the implementation of the Record 7, the audit concluded that the INS has handled



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it well management and have been conducting activities in accordance with the requirements of the Environmental Management Plan, for the Record in question.

### *Audit Recommendations*

The audit recommends the INS to continue implementing the Public Health Program in the way it has done so far as it has achieved compliance with general and specific objectives established for this Record.

### **Record No. 8: Contingency Plan**

Given the importance of addressing the emergency discharges that occur during PECIG operation in the different nuclei, Record 8 of the Environmental Management Plan will be audited based on the dumping that has occurred in this period.

### *Audit Observations*

Table 7 summarizes the dumping that occurred during the period audited in different nuclei of the PECIG operation.

**Table 7: Dumping during the audit period**

| PROVINCE | BASE                  | DATE             | COORDINATES                  | DISCHARGE HEIGHT |
|----------|-----------------------|------------------|------------------------------|------------------|
| Putumayo | Villagarzón           | 24 DECEMBER 2006 | N: 00° 36.91<br>W: 76° 27.32 | 3.970 feet       |
| Guaviare | San José del Guaviare | 17 JANUARY 2007  | N: 02° 27.25<br>W: 72° 30.52 | 3.600 feet       |
| Guaviare | San José del Guaviare | 6 JANUARY 2007   | N: 25° 34.6<br>W: 73° 22.38  | 1500 meters      |
| Caquetá  | Larandia              | 6 JANUARY 2007   | N: 00° 24.96<br>W: 77° 11.47 | 415 AGL          |

SOURCE: Dumping Reports - Office of Verification and Environmental Management Plan (DIRAN)

After reviewing and analyzing the dumping reports (see Annex 1), the Audit was able to appreciate that some important aspects are not included, as is the effect on the natural resources, land, facilities and communities. In addition, the report on 17 January in San José del Guaviare does not specify the town onto which the discharge was made, neither does it have information of the area affected by the discharge.

Furthermore, the audit requested the technical reports which DIRAN should produce, to explain in detail the characteristics of the dumping and the area where it occurred in order to make the necessary visits; or to have this area in mind to handle the complaints that might arise in the future and these will be evaluated for future periods.



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### *Audit Findings*

The findings of non-compliance identified for this audited period correspond to deficiency at the time of processing the dumping reports, since they do not detail aspects such as the effect on natural resources, land, facilities and communities, and in addition, the report on 17 January in San José del Guaviare does not specify the town onto which the discharge was made, neither does it have information of the area affected by the discharge.

### *Audit Conclusions*

Based on the findings identified by the Audit it was concluded that the dumping reporting procedure does not meet the requirements of Record 8 of the Environmental Management Plan (Resolution 1054 of 2003 MAVDT). However, the Audit will review the reports generated by the DIRAN regarding these emergency releases and based on this review will determine the importance of the shortcomings in the initial reports.



### *Audit Recommendations*

According to the findings the Audit recommends that the commanders of the Bases and pilots responsible for filling out the forms in the dumping reports do so in greater detail, since these are the basis for the final report and the determination of impact of the emergency discharge on the environment or nearby communities if necessary.

### **Degree of compliance and progress in the implementation of the existing Environmental Management Plan**

Based on the information reviewed for this audit period, the findings and conclusions reached determine that it meets the requirements of the Environmental Management Plan, which allows us to conclude that the implementation of PECIG in the country is done properly.



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## 8. ASSESSING THE PROCESS OF HANDLING OF COMPLAINTS FOR ALLEGED DAMAGES CAUSED BY THE PECIG OPERATION

The purpose of this chapter is to present the results obtained by auditing the complaints handling process for this period. The number of complaints received, cleared and rejected during the audit period for the month of December 2006 have been taken into account.

### Consultation of the Data Operations Base of the System of Handling Complaints

Regarding the process of handling complaints in the month of December, 15 complaints were rejected for non-compliance of requirements.

The procedure for 79 complaints was declared ended, once the time specified had expired without completion of the information requested. It is worth noting that although the term states that 60 days should elapse, the DIRAN waited 4 months to terminate the procedures.

A total of 110 complaints were handled, of which 94 were completed and the remaining 16 are still in process.

When searching the system database, it was noted that there is an organized record of all incoming complaints, those that are returned and those that require field visit. Thus it is concluded that the complaints handling procedures meet the requirements of Resolution 017 of 2001 in this regard.

### Review of final answers to the complainant



To audit the complaints handling procedure in regard to final answers to the complainant, a checklist has been developed to detect whether all requirements of Resolution 017 of 2001 are being implemented properly.

For this period, 4 final answers have been audited that were selected at random. The results are shown in Tables 8, 9, 10 and 11.

**Table 8: Checklist for Handling of Complaints: Complaint 6409**

| ACTIVITY                                     | CONFORMITY                                   |    |            | OBSERVATIONS |
|--|--|----|------------|--------------|
|  | Yes  | No | Incomplete |              |
| Number of complaint 6409                     | Complainant Name: María Pereira de Rodríguez |    |            |              |
| <b>1. REQUIREMENTS OF THE COMPLAINT</b>      |  |    |            |              |
| Evidence that the appropriate form is used   | X  |    |            |              |
| Evidence that the form contains: Name of the | X  |    |            |              |



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|  |   |  |                |
|--|---|--|----------------|
| applicant and identification   |   |  |                |
| Evidence that the form contains: Name and location of the site   | X |  |                |
| Evidence that the form contains: A copy of title of property otherwise the statement of quality of exploitation of the allegedly affected property | X |  |                |
| Evidence that the form contains: current economic activity developed on the farm.  | X |  |                |
| Evidence that the form contains: List of the damage, identifying quality and quantity of affected assets   | X |  |                |
| Evidence that the form contains: date and time of spraying   | X |  |                |
| Evidence that the form contains: The purpose of the request  | X |  |                |
| Evidence that the form contains: A list of the accompanying documents and evidence   | X |  |                |
| Evidence that the form contains: Address of residence or location for receipt of a reply   | X |  |                |
| Evidence that the form contains: the signature of the petitioner and the receiving official  | X |  |                |
| <b>2. REFERRAL OF COMPLAINT TO DIRAN - DNE</b>   | X |  |                |
| Evidence of informing the complainant about the referral of the complaint  | X |  |                |
| <b>3. PREVIOUS REPORT</b>  | X |  |                |
| Evidence that DIRAN issued a certificate on receipt and process of the complaint and in the time made.   | X |  |                |
| Evidence that DIRAN performs the process required to determine the veracity of the complaint.  | X |  |                |
| <b>4. EVIDENCE REQUIREMENTS</b>  |   |  |                |
| Certification of the Anti-Narcotics Police (DIRAN) - on aerial spraying in the area of the complaint.  | X |  |                |
| Copy of flight reports of satellite tracking   | X |  |                |
| Copies of the report and spraying poligrams  | X |  |                |
| Copies of the report of field visit  |   |  | Not applicable |
| Others deemed appropriate and relevant   |   |  |                |

SOURCE: final response to complainants, Complaints Handling Office (DIRAN).

Complaint 6409 that was verified in Table 8 was rejected because no spraying lines had passed through the area reported by the complainant.

The audit found that, as shown in Table 8, the procedure established for handling care of this complaint complied with the requirements of Resolution 017 of 2001.





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**Table 9: Checklist for Handling of Complaints: Complaint 5583**

| ACTIVITY   | CONFORMITY                             |    |                | OBSERVATIONS  |
|--|--|----|----------------|---|
|  | Yes                                    | No | Incomplete     |   |
| Number of complaint 5583   | Complainant Name: Omar de Jesús Zapata |    |                |   |
| <b>1. REQUIREMENTS OF THE COMPLAINT</b>  |  |    |                |   |
| Evidence that the appropriate form is used   | X                                      |    |                |   |
| Evidence that the form contains: Name of the applicant and identification  | X                                      |    |                |   |
| Evidence that the form contains: Name and location of the site   |  |    | X              | The complaint did not include the name of the site.                   |
| Evidence that the form contains: A copy of title of property otherwise the statement of quality of exploitation of the allegedly affected property |  | X  |                |   |
| Evidence that the form contains: current economic activity developed on the farm.  | X                                      |    |                |   |
| Evidence that the form contains: List of the damage, identifying quality and quantity of affected assets   | X                                      |    |                |   |
| Evidence that the form contains: date and time of spraying   | X                                      |    |                |   |
| Evidence that the form contains: The purpose of the request  | X                                      |    |                |   |
| Evidence that the form contains: A list of the accompanying documents and evidence   |  | X  |                |   |
| Evidence that the form contains: Address of residence or location for receipt of a reply   | X                                      |    |                |   |
| Evidence that the form contains: the signature of the petitioner and the receiving official  | X                                      |    |                |   |
| <b>2. REFERRAL OF COMPLAINT TO DIRAN - DNE</b>   |  |    |                |   |
| Evidence of informing the complainant about the referral of the complaint  | X                                      |    |                |   |
| <b>3. PREVIOUS REPORT</b>  |  |    |                |   |
| Evidence that DIRAN issued a certificate on receipt and process of the complaint and in the time made.   |  |    |                |   |
| Evidence that DIRAN performs the process required to determine the veracity of the complaint.  | X                                      |    |                |   |
| <b>4. EVIDENCE REQUIREMENTS</b>  |  |    |                |   |
| Certification of the Anti-Narcotics Police (DIRAN) - on aerial spraying in the area of the complaint.  | X                                      |    |                |   |
| Copy of flight reports of satellite tracking   | X                                      |    |                |   |
| Copies of the report and spraying poligrams  |  |    |                |   |
| Copies of the report of field visit  |  |    | Not applicable | Since the complaint was rejected, the field visit was not authorized. |
| Others deemed appropriate and relevant   |  |    | Not applicable |   |

**SOURCE: final response to complainants, Complaints Handling Office (DIRAN).**





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Complaint 5583 that was verified in Table 9 was rejected because the term expired and the information was not complete. The audit found that the procedure for the handling of complaint 5583 complied with the requirements of Resolution 017 of 2001.





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**Table 10: Checklist for Handling of Complaints: Complaint 5642**

| ACTIVITY   | CONFORMITY   |    |                | OBSERVATIONS                             |  |
|--|--|----|----------------|--|--|
|  | Yes  | No | Incomplete     |  |  |
| <b>Number of complaint 5642</b>  | <b>Complainant Name: Blanca Lilia Zúñiga Preafán</b> |    |                |  |  |
| <b>1. REQUIREMENTS OF THE COMPLAINT</b>  |  |    |                |  |  |
| Evidence that the appropriate form is used   | X  |    |                | There is only one agreement among heirs. |  |
| Evidence that the form contains: Name of the applicant and identification  | X  |    |                |  |  |
| Evidence that the form contains: Name and location of the site   | X  |    |                |  |  |
| Evidence that the form contains: A copy of title of property otherwise the statement of quality of exploitation of the allegedly affected property |  | X  |                |  |  |
| Evidence that the form contains: current economic activity developed on the farm.  | X  |    |                |  |  |
| Evidence that the form contains: List of the damage, identifying quality and quantity of affected assets   | X  |    |                |  |  |
| Evidence that the form contains: date and time of spraying   | X  |    |                |  |  |
| Evidence that the form contains: The purpose of the request  | X  |    |                |  |  |
| Evidence that the form contains: A list of the accompanying documents and evidence   |  | X  |                |  |  |
| Evidence that the form contains: Address of residence or location for receipt of a reply   | X  |    |                |  |  |
| Evidence that the form contains: the signature of the petitioner and the receiving official  | X  |    |                |  |  |
| <b>2. REFERRAL OF COMPLAINT TO DIRAN - DNE</b>   |  |    |                |  |  |
| Evidence of informing the complainant about the referral of the complaint  | X  |    |                |  |  |
| <b>3. PREVIOUS REPORT</b>  | X  |    |                |  |  |
| Evidence that DIRAN issued a certificate on receipt and process of the complaint and in the time made  | X  |    |                |  |  |
| Evidence that DIRAN performs the process required to determine the veracity of the complaint.  | X  |    |                |  |  |
| <b>7. EVIDENCE REQUIREMENTS</b>  |  |    |                |  |  |
| Certification of the Anti-Narcotics Police (DIRAN) - on aerial spraying in the area of the complaint.  |  |    |                |  |  |
| Copy of flight reports of satellite tracking   | X  |    |                |  |  |
| Copies of the report and spraying poligrams  | X  |    |                |  |  |
| Copies of the report of field visit  |  |    | Not applicable |  |  |
| Others deemed appropriate and relevant   |  |    |                |  |  |

**SOURCE: final response to complainants, Complaints Handling Office (DIRAN).**

Complaint 5642, evidenced in Table 10, was rejected because the terms expired and the information was not complete. The Audit can concluded that the procedure for the handling of complaint5642 complied with the requirements of Resolution 017 of 2001.



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**Table 11: Checklist for Handling of Complaints: Complaint 5728**

| ACTIVITY   | CONFORMITY                                      |    |                | OBSERVATIONS |
|--|---|----|----------------|--------------|
|  | Yes   | No | Incomplete     |              |
| Number of complaint 5728   | Complainant Name: José Vicente Cuesta Bohórquez |    |                |              |
| <b>1. REQUIREMENTS OF THE COMPLAINT</b>  |   |    |                |              |
| Evidence that the appropriate form is used   | X   |    |                |              |
| Evidence that the form contains: Name of the applicant and identification  | X   |    |                |              |
| Evidence that the form contains: Name and location of the site   | X   |    |                |              |
| Evidence that the form contains: A copy of title of property otherwise the statement of quality of exploitation of the allegedly affected property | X   |    |                |              |
| Evidence that the form contains: current economic activity developed on the farm.  | X   |    |                |              |
| Evidence that the form contains: List of the damage, identifying quality and quantity of affected assets   | X   |    |                |              |
| Evidence that the form contains: date and time of spraying   | X   |    |                |              |
| Evidence that the form contains: The purpose of the request  |   | X  |                |              |
| Evidence that the form contains: A list of the accompanying documents and evidence   |   | X  |                |              |
| Evidence that the form contains: Address of residence or location for receipt of a reply   | X   |    |                |              |
| Evidence that the form contains: the signature of the petitioner and the receiving official  | X   |    |                |              |
| <b>2. REFERRAL OF COMPLAINT TO DIRAN - DNE</b>   |   |    |                |              |
| Evidence of informing the complainant about the referral of the complaint  | X   |    |                |              |
| <b>3. PREVIOUS REPORT</b>  |   |    |                |              |
| Evidence that DIRAN issued a certificate on receipt and process of the complaint and in the time made.   | X   |    |                |              |
| Evidence that DIRAN performs the process required to determine the veracity of the complaint.  |   |    |                |              |
| <b>7. EVIDENCE REQUIREMENTS</b>  |   |    |                |              |
| Certification of the Anti-Narcotics Police (DIRAN) - on aerial spraying in the area of the complaint.  | X   |    |                |              |
| Copy of flight reports of satellite tracking   | X   |    |                |              |
| Copies of the report and spraying poligrams  | X   |    |                |              |
| Copies of the report of field visit  |   |    | Not applicable |              |
| Others deemed appropriate and relevant   |   |    |                |              |

SOURCE: final response to complainants, Complaints Handling Office (DIRAN).

Complaint 5728, summarized in Table 11, was rejected for lack of spraying in the area reported in the corresponding date. The audit found that, as shown in Table 11, the procedure for the



|   |  |   |
|---|--|---|
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handling of complaint 5728 complied with the requirements of Resolution 017 of 2001.

***Audit Findings***

After analyzing the final answers to the complainants, the Audit could conclude that it identified no findings of noncompliance for this period.

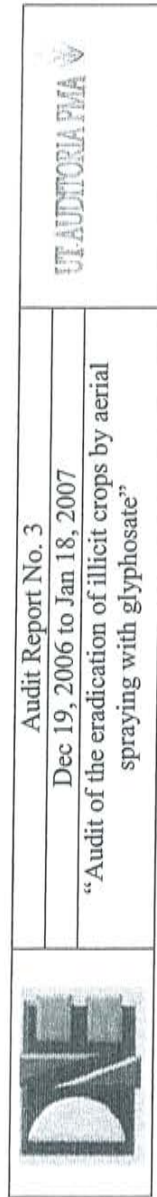
***Audit Conclusions***

Since no findings were identified, the audit concluded that the procedure for handling complaints complies with the requirements of Resolution 017 of 2001.

***Audit Recommendations***

The audit recommends continuing with the complaints handling procedures as have been implemented so far.





### Complaint Verification Visit

During the audited period, a visit of verification of complaints was performed on 11, 12, 13 and 14 January 2007. The commission was part of the complaints committee was made up of technicians from the following institutions:

- Anti Narcotics Police - DIRAN
- Narcotics Affairs Section of the Embassy of the United States of America - NAS
- Ministry of Environment, Housing and Territorial Development (MAVDT)
- Instituto Colombiano Agropecuario, ICA
- National Narcotics Directorate (DNE)
- PECIG Audit: Unión Temporal Auditoría PMA

Complaints that were visited in order to determine whether the alleged damage caused by PECIG required compensation or not are listed in Table 12. This table shows the coordinates of the plots, the name of the complainant, the location of each property the date of spraying and a summary of the relationship of the alleged damage caused.

**Table 12: Specifications of Complaints Visited**

| POINT | NORTH       | EAST          | COMPLAINANT | NAME                       | DAMAGE                                    | MUNICIPALITY | PROVINCE | DATE OF SPRAYING |
|-------|-------------|---------------|-------------|----------------------------|---|--------------|----------|------------------|
| 1     | 1° 2' 34.9" | 76° 26' 49.0" | 5732        | MARTHA CORTEZ              | 1/4 Ha yucca, 01 ha pildoro               | PIAMONTE     | CAUCA    | 09-Ago-05        |
| 2     | 1° 2' 26.9" | 76° 26' 37.8" |             |                            |   |              |          |                  |
| 3     | 1° 2' 10.2" | 76° 26' 23.0" |             |                            |   |              |          |                  |
| 4     | 1° 2' 19.2" | 76° 25' 48.9" |             |                            |   |              |          |                  |
| 5     | 1° 1' 45.6" | 76° 25' 23.4" | 5733        | BOSCO DE JESUS ARCOS ORTIZ | 03 Ha sugarcane                           | PIAMONTE     | CAUCA    | 09-Ago-05        |
| 6     | 1° 1' 54.1" | 76° 25' 20.1" |             |                            |   |              |          |                  |
| 7     | 1° 1' 43.5" | 76° 25' 13.0" |             |                            |   |              |          |                  |
| 8     | 1° 1' 29.9" | 76° 25' 23.7" | 5736        | LETICIA RENZA ROJAS        | 01 Ha corn and 01 Ha yucca                | PIAMONTE     | CAUCA    | 09-Ago-05        |
| 9     | 1° 1' 17.9" | 76° 25' 32.7" |             |                            |   |              |          |                  |
| 10    | 1° 1' 32.5" | 76° 25' 48.2" | 5734        | GLORIA                     | 1 1/2 Ha plantain, 1/2 Ha corn and 1/2 ha | PIAMONTE     | CAUCA    | 09-Ago-05        |
| 11    | 1° 1' 36.2" | 76° 25' 45.5" |             |                            |   |              |          |                  |
| 12    | 1° 1' 1.3"  | 76° 25' 19.3" |             |                            |   |              |          |                  |





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|    |              |               |                                       |  |                              |          |                         |
|----|--------------|---------------|---------------------------------------|--|------------------------------|----------|-------------------------|
| 13 | 1° 1' 54.6"  | 76° 25' 1.3"  | AMPARO<br>DUQUE VELA                  | yucca  |                              |          |                         |
| 14 | 1° 1' 5.6"   | 76° 26' 49.0" |                                       |  |                              |          |                         |
| 1  | 1° 32' 10.0" | 75° 44' 59.0" | NEBIO DE JESUS<br>ARENAS<br>SEPULVEDA | 01 Ha grass and corn, 02 Ha plantain, 02 Ha greater grass, fruit and wood trees                                      | MORELIA                      | CAQUETÁ  | 18-20-Sep-06            |
| 2  | 1° 30' 9"    | 75° 46' 6.0"  |                                       |  |                              |          |                         |
| 3  | 1° 31' 31.0" | 75° 46' 27.0" | ALVARO<br>MUÑOZ MUÑOZ                 | 01 Ha plantain and 03 Ha pineapple and papaya  | MORELIA                      | CAQUETÁ  | 18-20-Sep-06            |
| 4  | 1° 31' 19.0" | 75° 46' 40"   |                                       |  |                              |          |                         |
| 5  | 1° 29' 0"    | 75° 51' 59.0" | MARIA GORETTI<br>SILVA ROJAS          | 01 Ha brachiaria grass, 1/2 Ha yucca, 1/2 rice, 02 Ha platin, 06 Ha mountain and stubble, 30 wood and 20 fruit trees | BELEN DE<br>LOS<br>ANDAQUIES | CAQUETÁ  | 22-Ago-06               |
| 6  | 1° 28' 50"   | 75° 52' 32.0" |                                       |  |                              |          |                         |
| 7  | 1° 28' 42"   | 75° 53' 10.0" |                                       |  |                              |          |                         |
| 8  | 1° 6' 38"    | 75° 51' 35.8" | JESUS ANTONIO<br>MEDINA<br>VALBUENA   | 1/2 Ha yucca, 01 Ha brachiaria grass, 180 mafalda grass plants, 1625 plantain plants and 438 fruit trees             | ALBANIA                      | CAQUETÁ  | 21-Ago-06               |
| 9  | 1° 15' 14"   | 75° 53' 50.3" | IDELFONSO<br>RODRIGUEZ<br>SOLORZANO   | 02 Ha rubber, plantain, yucca and araza  | ALBANIA                      | CAQUETÁ  | 14-Oct-05               |
| 10 | 1° 14' 58.4" | 75° 53' 56.3" | BERNARDINO<br>RODRIGUEZ<br>SOLORZANO  | 06 Ha rubber, plantain, yucca, araza, sugarcane and pineapple  | ALBANIA                      | CAQUETÁ  | 16-Sep-05               |
| 11 | 1° 14' 43.4" | 75° 54' 27.6" | JESUS NICOLAS<br>GAITAN<br>SANCHEZ    | 02 Ha rubber, 1600 plantain plants, 01 Ha yucca  | ALBANIA                      | CAQUETÁ  | 21-Ago-05 and 14-Oct-05 |
| 12 | 1° 11' 40.6" | 75° 55' 1"    | SATURNINO<br>CALDERON                 | 05 Ha rubber, yucca and colimo, 340 fruit trees (sour sop and araza)   | ALBANIA                      | CAQUETÁ  | 12-Sep-05 and 14-Oct-05 |
| 13 | ° 53' 49"    | 75° 35' 8"    |                                       |  |                              |          |                         |
| 14 | ° 53' 46"    | 75° 34' 48"   | WILSON ISAZA<br>BURITICA              | 01 Ha yucca and plantain, 02 Ha rubber, 02 Ha araza, 02 Ha grass, 02 Ha wood trees and 01 Ha stubble                 | SOLITA                       | CAQUETÁ  | 22-Ene-06               |
| 15 | ° 53' 35"    | 75° 34' 32.0" |                                       |  |                              |          |                         |
| 1  | ° 35' 5"     | 77° 1' 12.0"  | MANUEL<br>CHAMORRO<br>VILLOTA         | 02 Ha pineapple, 01 Ha cutting grass, 02 Ha copuazú and 05 Ha stubble  | ORITO                        | PUTUMAYO | 15-Sep-06               |
| 2  | ° 33' 10"    | 77° 1' 47.0"  |                                       |  |                              |          |                         |
| 3  | ° 32' 55"    | 77° 1' 49.0"  |                                       |  |                              |          |                         |
| 4  | ° 18' 22.1"  | 76° 56' 36.5" | MANUEL JESUS<br>RIOFRIO<br>MARTINEZ   | 03 Ha pepper and corn, 1/4 Ha plantain   | SAN MIGUEL                   | PUTUMAYO | 04-08-Nov-05            |
| 5  | ° 17' 36.3"  | 76° 56' 10.6" | SOCORRO<br>CARVAJAL                   | 01 Ha pastures, 01 Ha pepper   | SAN MIGUEL                   | PUTUMAYO | 07-Dic-05               |

Source: Complaints Office – DIRAN



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Before conducting the complaints verification visits, a meeting took place among the participants to explain the procedure in relation to:

- Selection of complaints
- The public order situation in the area
- Details of the operation relating to the logistics of flights: amount and type of aircraft required
- The verification procedure and criteria for filling out the data Records of each complaint

After the DIRAN Complaints Area assessed the complaints based on Resolution 017 of 2001, the following step was to confirm, with satellite images, the presence of spraying lines within 150 meters of the coordinates where the property of the complaint is located. Then the guideline booklets were handed out, containing all the information required to verify each complaint and to establish on the field the coordinates of the property, the presence of illicit crops, the existence of other licit crops and their status and evidence of spraying on them.

Once the prior proceeding is ended, the commission traveled by helicopter to each area and began the field process. Each member of the technical committee filled out the booklet, verified coordinates with the GPS and took the corresponding photographic record on each farm. The sites were marked by the launch of a smoke grenade from the lead helicopter to the georeferenced site.

After the mission was concluded, participants organized the information and classified the photographs taken in the verification. This material was submitted to the DIRAN Complaints Area to be later valued by participants, at a technical meeting and consequently issue the respective opinion.

Given the importance of the technical opinion that is provided, considering that this will have evidentiary value in the process to compensate or deny the complaints, the Audit considers it prudent to deliver the report, photographic record and opinion after the meeting is over; so that the opinion is established based on the estimation of all the technical equipment involved in the process.



### ***Audit Findings***

The audit has no findings for the development of the complaints verification visit.

### ***Audit Conclusions***

With regard to the protocol required for field verification, the Audit considers that the



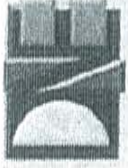
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requirements of Resolution 017 of 2001 of the National Narcotics Council have been satisfied.

***Audit Recommendations***

Given that no findings were identified for the activities related to the verification visit and handling of complaints, the Audit recommends the continuance of the activities as they have been performed so far.



|   |                              |                    |
|---|------------------------------|--------------------|
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**9. ANALYSIS OF COMPLIANCE OF THE PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING WITH GLYPHOSATE (PECIG) UNDER CURRENT ENVIRONMENTAL REGULATIONS**

The following table summarizes the findings identified during the audit work to the different stages of PECIG in the period from December 19, 2006 to January 18, 2007.

| REGULATIONS   | DISCOVERY OF NON-COMPLIANCE  |
|---|--|
| <p>Record No. 2: Industrial Security Program in the Popayan Operating Base (Resolution 1054 of 2003 MAVDT)</p>    | <ul style="list-style-type: none"> <li>The floor of the storage area of agrochemicals, fuels and lubricants does not meet the required parameters for the storage of such substances.</li> <li>The chemicals storage area has no roof, which places them in direct contact with the sun, rain and wind. The main adverse effect of this breach is that the chemicals can come into direct contact with rain water and thus could lead to contamination of soil or water sources near the base.</li> <li>The perimeter spill containment walls are not well installed; in the event that this spill occurs, it could contaminate the soil and water sources near the base.</li> <li>Signage is very poor; it only consists of a yellow ribbon around the place of storage of agrochemicals. Also the installed pictograms are insufficient and are located in non visible places, which does not allow distinguishing the type of procedure performed on each area and the precautions to be taken upon entry.</li> </ul> |
| <p>Record No. 3: Solid Waste Management Program in the Popayan Operating Base (Resolution 1054 of 2003 MAVDT)</p> | <ul style="list-style-type: none"> <li>The final disposal of organic waste has no lid; this can cause odor and presence of vectors. In addition, the bins do not have the appropriate signage pictograms.</li> <li>The special solid waste disposal is done in an uncovered container that does not guarantee that the waste remain in the container; it can also cause the presence of vectors.</li> </ul>  |







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UT-AUDITORIA.PMA V

Record No. 8: Contingency Plan

In reviewing the contents of the dumping report forms, the Audit determined that some aspects are not detailed, such as the effect on natural resources, land, facilities and communities. In addition, the report on 17 January in San José del Guaviare does not specify the municipality on which the discharge is made, and there is no overview of the affected area.



|   |                              |   |
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## 10. PROPOSED CORRECTIVE ACTION TO BE TAKEN BY THE PROGRAM TO COMPLY WITH CURRENT LAW



The following table describes the corrective actions proposed in order that the Program For The Eradication Of Illicit Crops With Glyphosate meets the requirements of the Environmental Management Plan and other legislation.

| PROPOSED ACTIVITY   | RESPONSIBLE                   | TERM    |
|---|-------------------------------|---------|
| <p><b>Record No. 2: Industrial Security Program in the Popayán Operating Base</b></p> <p>The Audit recommends first that the DIRAN note that although it is a Mobile Base important factors cannot be ignored such as proper storage of chemicals. Secondly, the following is recommended:</p> <ul style="list-style-type: none"> <li>• The floor of the agrochemical storage area, is not made in concrete, must be better covered to avoid direct contact of the bins with the soil and potential infiltration problems and subsequent contamination of the soil.</li> <li>• The agrochemical storage area should have a roof, it can be similar to the polishade that is installed for fuels and lubricants; its main purpose is to protect the glyphosate bins.</li> <li>• Special care must be taken when installing the side retaining walls because, should a spill of chemicals, fuels and/or lubricants occur, this structure must be able to withstand it and prevent contamination of water or soil in the area.</li> <li>• The signage of the different areas must be adequate, with pictographs located strategically in order to clearly identify each area and the precautions to be taken to enter each.</li> </ul> | Anti Narcotics Police - DIRAN | 1 month |
| <p><b>Record No. 3: Solid Waste Management Program at the Popayán Operations Base</b></p> <ul style="list-style-type: none"> <li>• That the bins that are used to deposit domestic and special solid waste must have the appropriate cover to avoid the presence of vectors and therefore ensure their safe storage</li> <li>• The signage of bins must have visible characters that identify their contents and the symbol for each type of waste.</li> </ul>  | Anti Narcotics Police - DIRAN | 1 month |



|   |                               |          |
|---|-------------------------------|----------|
| <ul style="list-style-type: none"> <li>The audit recommended that the commanders of the bases and pilots responsible for completing the dumping report form do so in more detail, since these are the basis for the final report and determination of the impact that the emergency discharge has had on the environment or surrounding communities, if any.</li> </ul>   | Anti Narcotics Police - DIRAN | 2 months |
| <ul style="list-style-type: none"> <li>Although there were no findings for this period and it was concluded that the requirements of Resolution 017 of 2001 have been met, the Audit recommends bearing in mind the importance of developing regular training to municipal inspectors and UMATA directors, who are the people responsible for handling the complaints form, so that they know the procedure well and avoid administrative wear, return of processes and therefore generate delays in the issuance of the final answer.</li> </ul> | Anti Narcotics Police - DIRAN | 2 months |



|   |  |   |
|---|--|---|
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## 11. ANALYSIS OF TRENDS AND DYNAMICS OF ILLICIT CROPS AT THE MUNICIPAL AND PROVINCE LEVEL

As the methods of controlling illicit crops have adjusted and intensified, so has the process of coca leaf production been changing in terms of strategies concerned. The purpose of this analysis is to detect these strategies that allow maintaining production of the alkaloid, which is reflected in its steady supply.

One of the important dynamics that is generated in the Coca leaf production process is the rapid replacement of controlled areas. In the case of Putumayo, this factor has contributed to the crop area trying to remain stable, despite the control being exercised today. Note in Table 13 that cocaine production in Colombia has been stable over the past two years. It is clear that the variables that maintain this situation are diverse (productivity, performance, agronomic management, stability in the cultivated area, and others). Consequently, the Audit proposes to explore, taking advantage of the field visits and the information to which it has access, the situations that arise at the crop level and which contribute to continuing the problem.

**Table 13: Potential World Cocaine Production**

|          | 1995 | 1996 | 1997 | 1998 | 1999 | 2000  | 2001 | 2002 | 2003 | 2004       | 2005       | %<br>Chan<br>ge<br>2004-<br>2005 | % of<br>total<br>2005 |
|----------|------|------|------|------|------|-------|------|------|------|------------|------------|----------------------------------|-----------------------|
| Bolivia  | 240  | 215  | 200  | 1150 | 70   | 43    | 60   | 60   | 79   | 107        | 90         | -16%                             | 10%                   |
| Peru     | 460  | 435  | 325  | 240  | 175  | 1,411 | 150  | 165  | 155  | 190        | 180        | -5%                              | 20%                   |
| Colombia | 230  | 300  | 350  | 435  | 680  | 695   | 617  | 580  | 550  | <i>640</i> | <i>640</i> | 0                                | 70%                   |
| Total    | 930  | 950  | 875  | 825  | 925  | 879   | 827  | 805  | 784  | 937        | 910        | -3                               | 100%                  |

Source: UNODC, italic figures are revised in 2005

The photos below, taken in different parts of the country—particularly in Putumayo and Caquetá—show the situation of the rapid replacement of the coca crop once it has been sprayed.





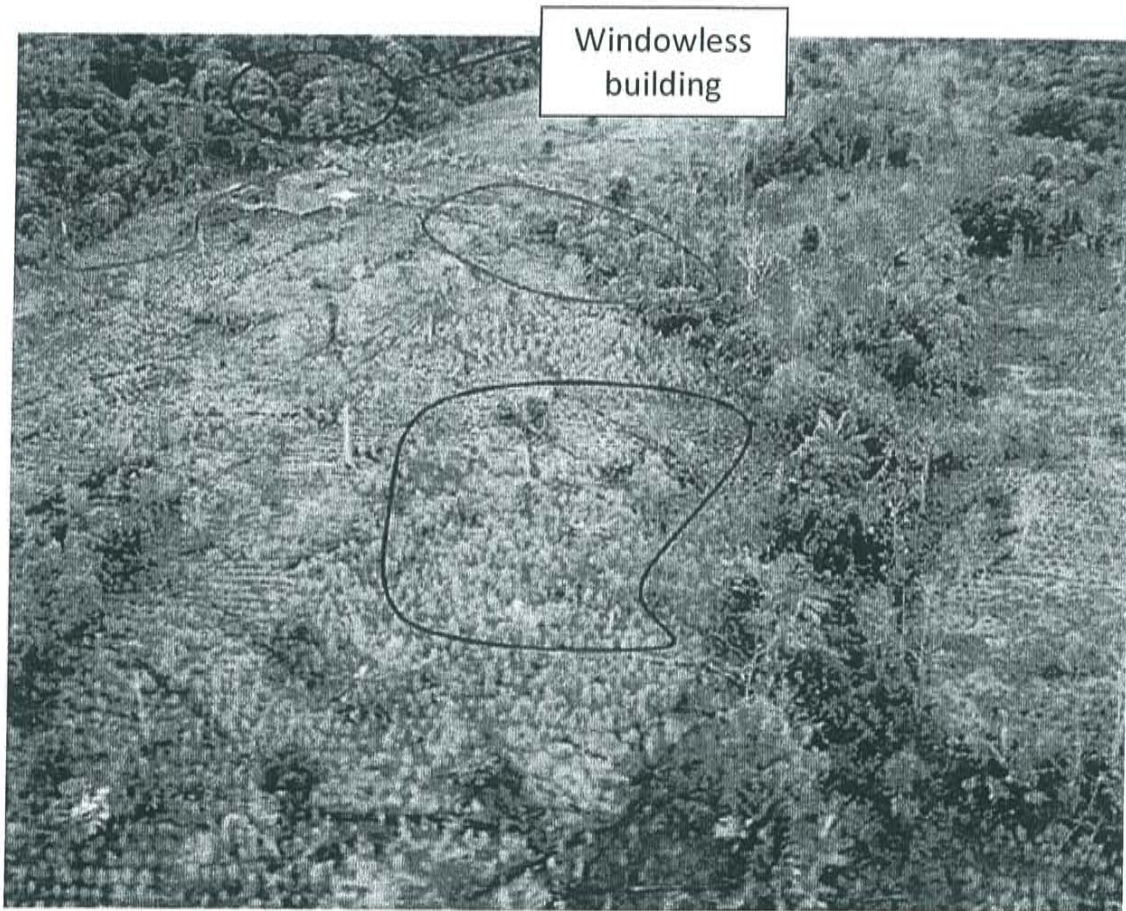
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|  | Audit Report No. 3   | UPT AUDITORIA PMA  |
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Image 25 is from a photo taken in the municipality of Orito, Putumayo, showing how part of the crop that was damaged with spraying has been quickly replaced. For this reason plants are at different heights, the top left displays some constructions, the largest of these is not housing for its lack of windows: it is naturally dedicated to the processing of coca leaf.

**Image 25: Illicit Crops in the Municipality of Orito (Putumayo)**



Note: The green lines show the larger crop, the red lines show the smaller crop.







|   |  |  |
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Image 26 is a photo taken in the municipality of Morelia, Province of Caquetá, showing that the land is quickly being made suitable for a new planting of coca crops and replace those that were eradicated by aerial spraying.

**Image 26: Illicit Crops in the municipality of Morelia (Caqueta)**



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## 12. AUDIT CONCLUSIONS AND RECOMMENDATIONS

- From the Audit of the Operation of the Program for Illicit Crop Eradication By Aerial Spraying With Glyphosate, it can be concluded that proper procedures are being used, as required in Record 1 of the Environmental Management Plan. The operational aspects include: detection and spraying (during this period there were no verifications). Upon analyzing the development of these areas the existence of maps, photographs and written reports was verified, all which contain the identification of land use, ecologically fragile areas, environmental, social and economically sensitive. Likewise, the geographical coordinates of the plots to be eradicated have been accurately identified as well as the record of all spraying operations performed during the audited period. Given that findings were not identifying for this period, the Audit has no recommendations.
- The implementation of Records 2, 3 and 4 of the Environmental Management Plan, which regulate the operational and environmental characteristics of the Popayan Operations Base, has been done properly. However, there are some findings that DIRAN should consider in order to optimize the work of implementing the Environmental Management Plan in this and all Operation Bases. The findings allow the Audit to make the following recommendations:
  - The floor of the agrochemical storage area, if not made in concrete, must be covered in a better way to avoid direct contact of the bins with soil and potential problems of infiltration and subsequent soil contamination.
  - The agrochemical storage area should have a roof. It may be similar to the polishade installed for fuels and lubricants; the main purpose is to protect the glyphosate bins.
  - Care must be taken when installing the side retaining walls; should there be a spill of chemicals, fuels and/or lubricants, this structure must be able to withstand it and prevent contamination of water or soil in the area.
  - The signage of the different areas must be adequate, with pictographs located strategically in order to clearly identify each area and the precautions to be taken to enter each.
  - The bins that are used to deposit domestic and special solid waste, and solid waste related to handling of agrochemicals must carry the appropriate cover to avoid the presence of vectors and therefore ensure their safe storage.
  - The signaling of the bins must have visible characters that identify their contents and the related symbol for each type of waste.
- With regards to the implementation of Records 5, 6 and 7, the Audit concludes that the procedures established by the Environmental Management Plan have been implemented properly.
- With regard to Record 8, while reviewing the dumping reports, the Audit identified some weaknesses, for which it recommends that commanders of the Bases and pilots responsible



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for completing the dumping report form, do so with more detail, since these are the basis for drawing up the final report and identification of the impact that the emergency discharge has on the environment or surrounding communities, if any.

- The complaints handling system produced no findings of noncompliance for this period. However the audit recommends taking into account the importance of developing regular training to municipal inspectors and UMATA directors who are responsible for processing the grievance form, in order that they are familiar with the procedure and therefore avoid administrative wear, devolution of processes and consequently generate delays in the issuance of the final answer.
- In general the conclusion is that during the period audited, the PECIG met the required parameters in Resolutions 1054 of 2003 and 017 of 2001, regarding the implementation of the Environmental Management Plan and the Handling of Complaints, noting that some findings of noncompliance were identified for which recommendations were made that will help improve the development of the operating and functional process of PECIG.







**Annex 42**

**NOTE 3111-2-14218 FROM THE MINISTRY FOR THE ENVIRONMENT  
IN RESPONSE TO NOTE 10945 OF 22 JULY 1998 FROM THE NATIONAL  
NARCOTICS DIRECTORATE (DNE), 28 JULY 1998**

*(Archives of the Colombian Foreign Ministry)*



REPUBLIC OF COLOMBIA

**MINISTRY FOR THE ENVIRONMENT**  
**Sustainable Development Division**  
**Licenses Section**

28 Jul 1998

3111-2-

14218

**Santafe de Bogota, D.C.**

Ms.  
IVONNE ALCALA AREVALO  
Director  
National Narcotics Directorate

Reference: Note 10945 dated 22 July 1998

Dear Ms.:

In reply to your note in the reference, I respectfully inform you that this Section has established the date 30 July 1998, at 10:00 a.m. for submission of the Environmental Management Plan for the application of glyphosate herbicide for eradication of illicit crops.

Sincerely,

**GUILLERMO ACEVEDO MANTILLA**  
Assistant Director Environmental Licenses

c.c. File No. 793

PGAWORD-GLIFO1/28-JUL-98



**Annex 43**

**MINUTES AND ORDERS OF PRIOR CONSULTATION PROCESSES WITH  
INDIGENOUS COMMUNITIES, IN COMPLIANCE WITH THE COLOMBIAN  
CONSTITUTIONAL COURT'S RULING SU-0383.**

*(Archives of the Colombian Foreign Ministry)*



NOTE OF AGREEMENT OF THE CONSULTATION PROCESS WITH  
 AUTHORITIES AND INDIGENOUS ORGANIZATIONS OF THE COLOMBIAN  
 AMAZONIA ON POLICIES OF ERADICATION OF ILLICIT CROPS AS ORDERED  
 BY THE CONSTITUTIONAL COURT IN DECISION SU-383 / 2003

In compliance with mandate of Decision SU-383 / 2003 of the Constitutional Court, this formalization note of Consultation between authorities and organizations of indigenous communities of the Colombian Amazonia and the Colombian Government represented by Dr. Juan Carlos Vives-Menotti, Ministry of Interior and Justice (a.i.), in representation of the National Narcotics Council (CNE), as per Minute of August 1, 2003, and Mrs. Maria Inés Restrepo-Cañón, director of the Alternative Development Plan Program of the Office of the President, in representation of the Office of the President, per Resolution 1823 of September 12, 2003.

In furtherance of this process, it was agreed to conduct regional workshops regarding information of mandate ordered in decision for consultation policies of the Government of President Álvaro Uribe-Vélez, on eradication of illicit crops in the Colombian Amazonia, defining participation of indigenous authorities in representation of their communities in the areas of illicit crops, in order to inform effectively and efficiently the decision of the Constitutional Court and Government's policies, with full observance of principles and regulations contained in Agreement 169 of ILO, approved by Law 21 / 1991 and procedure established in that decision and meeting of a national meeting with delegates of the Colombian Amazonia departments to make the consultation, in accordance with above mentioned decision.

**Whereas**

The policy of eradication illicit crops is a State policy approved and ratified by the National Development Plan 2003-2006 of President, Álvaro Uribe-Vélez, "*Towards a Community State*" approved by Law 812 of June 26, 2003.

An essential component of this policy is to fight the problem of illicit drugs and organized crime, oriented "towards the dismantling of the process of production, trade and consumption of drugs, by means of forced and voluntary eradication of crops and the development in depressed areas and conflict through the implementation of an alternative development program that generates alternatives for subsistence and the generation of short-term income.

For many indigenous communities of the Colombian Amazonia, the consumption of coca leaf has had a traditional use rooted in its ancestral culture and which makes an integral part of their daily life, being essential in the life of every individual and its community.

The Colombian state protects the ethnical and cultural diversity of the Nation and in this constitutional framework respects the traditional use that the indigenous peoples make of the coca leaf a fundamental of their culture, and its commitment is



to preserve, strengthen and develop the legal and constitutional characteristics of the indigenous territories of the Colombian Amazonia.

**IT IS AGREED THAT:**

The eradication of illicit crops in indigenous territories of the Colombian Amazonia will be made in a concerted and verifiable manner, between the indigenous authorities and organizations and competent entities.

The consultation must establish times, verification and support mechanisms for the execution of alternative development programs consistent with the cultural and environmental characteristics of indigenous peoples and territories.

Regarding all other protected rights, the following is agreed:

- The Government will establish a “Regional Amazonia Working Group” with representatives of the indigenous organizations and authorities of the Amazonia and other State, regional and local entities, as a standing consultation forum for the formulation of a regional and integral policy of sustainable development.
- In consultation with indigenous authorities and organizations of the Colombian Amazonia, the Government undertakes to formulate and promote the approval of a policy document – Conpes – to contain economic, cultural, political environmental and investment aspects in the indigenous reservations and communities in this region. The Conpes document must include the following components, amongst others:
  1. Support to the formulation and financing of life plans.
  2. Guidelines to encourage indigenous territorial order in the conformation perspective of Indigenous Territorial Entities.
  3. Procedure to define health attention models of the Amazonia indigenous communities in furtherance of Article 22 of Law 691 /2001 and Articles 24 and 25 of Law 21 /1991.
  4. Definition of policies for indigenous communities in the border in the context of binational relations and foreign policy defined by the Government.
  5. Implementation of a strategy for the management of international cooperation funds for financing development proposals agreed by the Regional Amazonia Working Group.
  6. Definition of a specific component in the context of the National Guidelines for the Prevention and Attention of Indigenous Forced Displacement.
  7. Definition of an alternative substitution and development program adapted to their cultural particularities and procurement of funds for its implementation.

8. In the context of President Alvaro Uribe's Government, to continue compliance with agreements signed between the Government and the indigenous communities of the Colombian Amazonia for the manual eradication of illicit crops. (Mutual Agreement and Standing Committee of Cofán).
9. Support to bilingual and intercultural education programs proposed by the indigenous communities and authorities.

#### OTHER COMMITMENTS

The Government commits its political will to promote the *Ley Orgánica de Ordenamiento Territorial* (Organic Law of Territorial Order) filed on July 20, 2003 at the Congress, which develops the constitutional mandate for the creation of Indigenous Territorial Entities.

The Government will promote the definition of certain political principles regarding Human Rights for indigenous peoples of the Colombian Amazonia.

In the context of the National Development Plan, the Government will advance to define a policy for the agreed management of protected areas overlapped with indigenous territories in the Amazon region.

The Government will effect consultations to regulate Article 7 of Law 30 / 1986 to guarantee the traditional use of coca and other plants from which narcotics substances can be produced, used for cultural purposes.

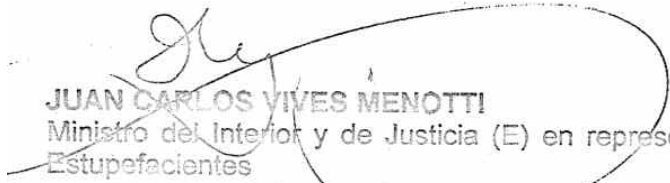
The Parties agree a term of 6 months to regulate and implement the Regional Amazonia Working Group and the Conpes formulation agreed here. The Government, through the Ministry of Interior and Justice will procure the necessary funds to guarantee indigenous interaction, to be made with a commission of 10 delegates formed by representatives of the departments and members of the OPIAC's executive committee.

In the context of President Uribe's government policies, the Government and the subscribing entities of the *Acuerdo Mutuo para la sustitución de cultivos de uso ilícito de coca en el departamento de Putumayo* (Mutual Agreement for the substitution of illicit use of coca in the department of Putumayo), "*Plan Integral Raíz por Raíz por la pervivencia de los pueblos indígenas*" (Integral Plan Root by Root for the survival of indigenous peoples) "*Mesa Permanente del Pueblo Cofán*" (Standing Committee of Cofán)", agree to meet with the representative institutions of the Indigenous peoples of Putumayo to evaluate and execute same, but only in matters consistent with guidelines and eradication programs of illicit crops and the Government's National Development Plan.

The Parties express their will to reach to a common agreement, and as needed, the international accompaniment of international organizations to guarantee the development to guarantee the development and compliance of this agreement

In witness whereof, this agreement is signed in Bogotá on November 14, 2003 by:

**For the Colombian Government**



**JUAN CARLOS VIVES MENOTTI**  
Ministro del Interior y de Justicia (E) en representación  
Estupefacientes

Minister (a.i.) of Interior and Justice in representation of the National Narcotics Council



**MARÍA INÉS RESTREPO CAÑÓN**  
Director of the Presidential Program: Alternative Development Plan

1. Department of Amazonas



**REYNALDO GIAGREKUDO**

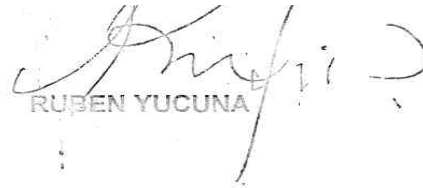


**MARTHA MORAN TETEVE**

2. Department of Caquetá



**ALVARO PIRANGA CRUZ**

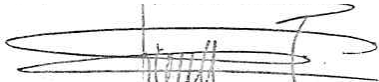


**RUBEN YUCUNA**



**GONZALO GASCA**

3. Department of Guanía



EFREN RAMIREZ SABANA



JAIRO DICUARA

4. Department of Guaviare



MAXIMO MARTINEZ




RUBEN SUAREZ



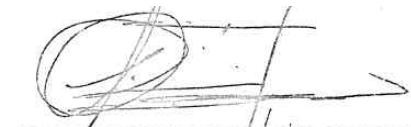
LUIS HERNANDO PAPURI

President Regional Indigenous Council of Guaviare – CRIGUA II

5. Department of Putumayo



JOSE SEBASTIAN JANSASOY  
Director E. ZIO-AI



JOSE BENEDICTO JUAJIBIOY




HUMBERTO GARCIA

President Awa Community



FRANCISCO TENORIO

President, Indigenous Zonal Organization of Putumayo, OZIP

  
WELINGTON CHAPAL

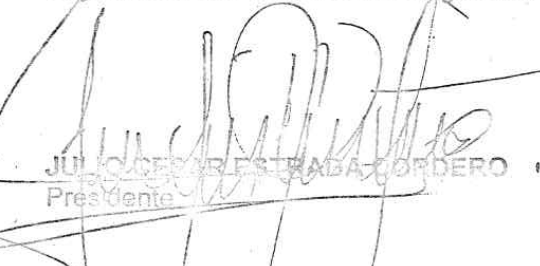
Coordinator Standing Committee Cofan Community

6. Department of Vaupés

  
JESÚS PEDREROS

  
SIMÓN VALENCIA LOPEZ

Organización de los Pueblos Indígenas de la Amazonía Colombiana

  
JULI CÉSAR DE ESTRADA CORDERO  
Presidente

  
JOSE SORIA JAVA  
Secretario General

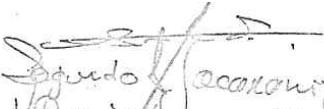

Organization of Indigenous Peoples of the Colombian Amazonia

President

Secretary General

NOTE: List of captains and indigenous authorities of the Colombian Amazonia present in the meeting attached:

Witnesses:

testigos:  
  
Segundo Jacaranday.  
Vicepresidente por Rincón para  
las Cuestiones Indígenas de la OOO  
  
Peter Kostichuk  
Co-Director, Alianza Amazónica

LIST OF INDIGENOUS AUTHORITIES OF THE COLOMBIA AMAZONIA  
PRESENT AT THE CONSULTATION PROCESS OF THE GOVERNMENT'S  
SPRAYING POLICIES

Bogotá, D.C. November 14, 2003

| NAME                   | COMMUNITY                           | TITLE                        |
|------------------------|-------------------------------------|------------------------------|
| Severino Junchis Tioy  | Mucandipá Mururáwacá                | Taita - Médico               |
| Juan Carlos            | Bella Cedralina P. Rosero           | Médico Tradicional           |
| Aracelis Bermúdez      | Guasipangá                          | Médico Tradicional           |
| Arsenio Yanangón       | Bolinos                             | _____                        |
| Néftalimoro            | Resguardo Siare.<br>REVA SIARE      | capitán                      |
| Carlos James Luango    | Panure G/te                         | Delegado                     |
| Walter D. Rodríguez    | Jimorón<br>Cañaveral                | Pl. Comunitaria              |
| Walter Descomar        | Cañacal                             | Gobernador                   |
| Walter Tucumanito Jaty | INGA - SANTIAGO<br>PUTUMAYO         | TAITA.                       |
| Antonio Vargas Pardo   | Nueva Palestina Putumayo            | Gobernador                   |
| Blanca Cecilia Hué     | Cabildo<br>Rocaver del Sur          | Gobernador                   |
| Alirio Rodríguez R.    | Minitas                             | Capitán                      |
| Jenny Yagony           | Asociación KIPAYO<br>Orito          | presidente,<br>Embera KIPAYA |
| Orlando López S.       | Asunción                            | Secretario<br>Comunidad      |
| Orlando Nupén          | Ordo Verde<br>Cabildo Soldado Bateo | Gobernador                   |
| Apolinar Condo Ilamo   | Resguardo La Aguadita               | Gobernador.                  |
| Teodoro Ocaso          | Orito                               | Consejo Autoridad            |

LIST OF INDIGENOUS AUTHORITIES OF THE COLOMBIA AMAZONIA  
PRESENT AT THE CONSULTATION PROCESS OF THE GOVERNMENT'S  
SPRAYING POLICIES

Bogotá, D.C. November 14, 2003

| NAME                       | COMMUNITY                                     | TITLE  |
|----------------------------|---|--|
| Ricardo Gutiérrez Valencia | Gorgona p. COT                                | Ve. CRJOML.  |
| Juanes Vacaquero           | Cons. Auto. No. Deito                         | Delegado.  |
| Camilo Chapin              | UNSP CHMB.<br>ORIMPA                          | Gobernador   |
| Francisco Buleto           | Donutic                                       | Gobernador   |
| INTEGRACIONALINSON         | ALBANIA.                                      | Gobernadora  |
| Juan Pango Ouy             | Agua Negra                                    | Coord. Gmunt. cas.<br>CRIMC                            |
| Marcelo Jankat de          | La Chorrera - Amambes                         | Lider.   |
| Ober Gasca Velencia.       | R.1 - EL DIAMANTE CRIMC<br>Koreguje Cg tai.   | Coordinador DTAI<br>de Selyul Indígena<br>del Casiquiá |
| Jorge Furayano             | ISNUNA  | Lider.   |
| Benjamin Díaz              | CRIGUA I                                      | Lider.   |
| Jesús Santacruz            | CRIVA   | Capitán  |
| Wiel Uleca                 | CRIVA   | Lider.   |
| José Reinaldo Rodríguez    | OZIRAU  | Delegado   |
| Oscar Pardo P.             | Gobernador y Pres. Aso.<br>pto Guzman. - CRIP | Gobernador<br>& Presidente Aso                         |
| José Evaristo García       | ASINEWESX                                     | Presidente   |
| Yreodonia González         | CRIVA -                                       | Delegado   |
| Bernardo Uchurde           | ASCAINCA                                      | presidente   |

LIST OF INDIGENOUS AUTHORITIES OF THE COLOMBIA AMAZONIA  
PRESENT AT THE CONSULTATION PROCESS OF THE GOVERNMENT'S  
SPRAYING POLICIES

Bogotá, D.C. November 14, 2003

| NAME                   | COMMUNITY           | TITLE                              |
|------------------------|---------------------|------------------------------------|
| Angel Jansasoy         | Condagua            | Alguacil M.                        |
| Martin Bepuro          | AguaNegra           | Docente                            |
| Juan Pirangallo        | Noticuri            | Caesque                            |
| Rolobel Marques basea. | Pto Noronzo         | Sanatorio cesione.                 |
| Duvan Piranga U.       | Hericho             | fiscal                             |
| Margareth Capi         | cator Veredo        | caesque                            |
| Yulber & Olanboduis    | solano              | concejal                           |
| Eliang Calderon        | R. de Esperanza     | Docente.                           |
| Alvaro Botero Manga    | Resguardo San Luis  | delegado                           |
| Marina Valencia        | Diamante            | coordinadora                       |
| Rnela Piranga Valencia | Diamante cogota     | delegada                           |
| * Maximiliano Valoz    | Hto. Vaupes.        | Estudiante                         |
| Marydifer              | ERIMA               | Coord. Recursos<br>NATURALES ERIMA |
| Aracely                | Muche               | delegado                           |
| JUAN BERNAL RESTREPO   | ORIVAM              | Delegado.                          |
| Daniel Valoz           | CRIMA               | delegado.                          |
| Jose' Basto R.         | Santa Rosa Juanambu | Gobernador                         |



LIST OF INDIGENOUS AUTHORITIES OF THE COLOMBIA AMAZONIA  
PRESENT AT THE CONSULTATION PROCESS OF THE GOVERNMENT'S  
SPRAYING POLICIES

Bogotá, D.C. November 14, 2003

| NAME                  | COMMUNITY                        | TITLE                              |
|-----------------------|----------------------------------|------------------------------------|
| <del>Amalberto</del>  | Villa Catalina                   | President Accu                     |
| Mapa y más Cuorin     | Pastos.<br>Autoridad Tradicional | Los Pastos 600                     |
| Alfonso Gamba-Libarte | Laguna Grande                    | Capitán                            |
| Damián González       | Minitas - Miralinda              | Representante Resal del Resguardo. |
| Faustino Pérez        | Comunidad Sapuata                | Capitán                            |
| Alberto Gómez         | Comunidad Sapuata                | Representante                      |
| Berardo Alvarado      | Tapira - Inmaculada              | Interventor                        |
| Marta Elisa Súa       | Comunidad Sapuata                | Representante                      |
| Miriam Jarama         | Gobernadora                      | Cabildo Siloé                      |
| Roberto Gómez         | Comunidad                        | Interventor                        |
| Maria Teresa Gómez    | Panure                           | delegada                           |
| José Antonio López    | Abanción                         | Capitán                            |
| Marta Gómez           | Panure                           | delegada                           |
| Roberto Gómez         | Yuncuma Antio                    | Gobernadora                        |
| Eduardo González      | Comunidad Sapuata                | Interventor                        |
| Norberto Gómez        | Comunidad Sapuata                | Interventor                        |
| Carlos H. Villalobos  | Comunidad Sapuata                | Interventor<br>Cabildo - Pastos    |

LIST OF INDIGENOUS AUTHORITIES OF THE COLOMBIA AMAZONIA  
PRESENT AT THE CONSULTATION PROCESS OF THE GOVERNMENT'S  
SPRAYING POLICIES

Bogotá, D.C. November 14, 2003

| NAME                   | COMMUNITY                      | TITLE                     |
|------------------------|--------------------------------|---------------------------|
| Silvino Piquiera       | Resguardo propio<br>Curripaeso | Viceministro<br>CRIGUA I. |
| Celestino Rivera       | El Libano                      | Aldablan                  |
| Marta Jara             | Sauces                         | consejal                  |
| Mariela Sabara         | Cuaima                         | Delegada                  |
| Taris Pedraza Gomez    | CRIVA                          | Coord. Salud.             |
| Tomas Roman            | OPIC                           | Coord. Medio am           |
| Pedro Rodriguez L.     | OPIC                           | Coord. OAH.               |
| Jose Engelberto Martin | Pastos Oro Verde               | Taita Mayor               |
|                        |                                |                           |
|                        |                                |                           |
|                        |                                |                           |
|                        |                                |                           |
|                        |                                |                           |

NOTE OF FORMALIZATION OF PRIOR CONSULTATION – ERADICATION OF  
ILLICIT CROPS WITH INDIGENOUS AUTHORITIES OF PUTUMAYO (PUERTO  
LEGUÍZAMO)

December 20 and 21, 2006

In compliance with Decision SU-373/ 2003 and Agreement signed on  
November 14, 2003 between the Colombian Government and the Indigenous  
Authorities of the Colombian Amazonia, prior consultation process was  
conducted as follows:

Installation – (December 20/2006)

Opening of Prior Consultation Process  
(Ministry of Interior and Justice – Ethnic Directorate)

As provided for by Law, the Ethnic Directorate makes a presentation of what  
is, how does operate and the importance of the prior consultation process,  
compliance with Decision SU-383 and all other legal provisions.

Then, the introduction of participant officers, invitees and indigenous  
authorities present is made.

The indigenous authorities present, taking advantage of the various officers  
of Official entities described their concerns regarding the process. These  
concerns were answered to and the Agenda to continue was established for  
the following day.

Socialization of the Process (December 20, 2006)

The indigenous authorities headed by senior participants with knowledge of  
the matter, Liborio Muñoz (JHRIJIRI), Dapid Perdomo-Hernández (Santa Rita),  
Héctor Yaiguaje (Gaoya) and Jorge Torres (indigenous reservation of KICHWA  
ALTO NAPORUNA) made the presentation on the meaning of coca plant,  
tobacco and Yagé for the indigenous community, according to the  
knowledge inherited by their ancestors.

The say that coca is life image of the Creator, the Image of Christ delivered at the High Throne, which means the life plans of the indigenous jurisdictions (reservation), coca is the intelligence that God gives us as a gift. Unfortunately, today it has taken two paths: that of the ancestral use and that which departs from it, used for interests other than the welfare and health of the communities.

Likewise, regarding tobacco and *yagé*, it is said that these are plants that give them force, redirectioning of life, organization, work, respect, food, clothing, health and life increase, amongst others.

## **PRESENTATION OF GENERAL POLICY –ANTI-DRUGS (National Narcotics Directorate-DNE)**

Dr. Elena Ramos made a detailed explanation of the Drugs Policy which is included in the National Development Plan with emphasis on strategies set out by the State to fight illicit drugs, stressing the need of break up drug production processes, processing, traffic and consumption. Also, emphasis is made regarding compliance with decision of Article of the Constitutional Court, with due respect of the ancestral consumption by indigenous communities and implementing State programs for the eradication of illicit crops not used for this purpose.

## **PRESENTATION OF THE OPERATING PART OF PROCEDURE AND FORMS OF ERADICATION (Anti-Narcotics Police)**

Maj. Miguel Antonio Tunjano explained the diagnostics of illicit crops of coca in areas of indigenous reservations in Putumayo.

He presented the legal, technical and environmental framework for the development of aerial and manual eradication operations.

Additionally, eradication mechanisms, taking account detection processes, aerial spraying, manual eradication and verification.

## **TECHNICAL ANALYSIS OF POLICE PRESENTATION (Colombian Agriculture and Livestock Institute – ICA)**

Dr. Jorge Arturo Rodríguez mentioned the commitment of the Institute with the eradication program of illicit crops, such as to guarantee the application of the herbicide under parameters approved by the Group of Agricultural inputs. He also mentions how glyphosate is a freely traded product in Colombia and in 96% of total Colombian sales of the molecule, has been used in various licit crops. Finally, he reported on the technical advantages of using the coadjuvant product. COSMOFLUX, also approved by ICA and freely traded in Colombia.

## ENVIRONMENTAL IMPACTS

### MINISTRY FOR THE ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT

Eng. José Agustín Zea presented the Environmental Management Plan of the Eradication Program of illicit Crops, amended by Resolution 1054 / 2003, made up of 8 sheets.

He gave details of follow-up processes to the various activities described in the Environmental Management Sheets.

NOTE OF THE TRANSLATOR: Page hand-numbered (536) missing.

..... who grants them and Puerto Leguízamo is not included. The Government presents the Forest Ranger Families proposal which includes the implementation of productive processes. He says that besides ADAM there are other entities that grant international cooperation funds.

Carlos Sáenz, Head of the Nature Park LA PAYA program, says that the purpose of the Park is to maintain the biological and cultural diversity found within it and for this reason, regarding spraying and manual eradication there is a series of procedures defined by Resolution No. 105 / 2005, which establishes the steps for making eradication without damaging flora and fauna. In the eradication process, it must be taken into account that this is an economic situation where communities live. There was an experience in Leguízamo of another eradication process approximately 5 years ago, where, although economic alternatives were given, no follow-up was made on it, and after some years, funds were spent because projects were not viable in economic and social terms. Therefore, when mounting an eradication operation, economic alternatives must be presented, and these must be viable at economic, social and environmental levels. Regarding parks we have been working in the search of productive alternatives in the Park areas with sustainable systems projects for participatory conservation and restoration, developed in the buffer zone and inside the Park, respectively. We consider that what is being done from the parks could be worked complementarily with the eradication program proposal. In Parks, we will be attentive that the protection of biological and cultural diversity is complied with.

The *Kichwas* Governors claim recognition of their ethnic group before the Ministry and say that no agreement can be reached when their territories have not been even been recognized as Indigenous Reservations.

The communities have been informed of the eradication and PLANTE 5 years ago, and the results were negative because funds were diverted by the NGOs responsible for the projects at the time. In fact, there is no credibility in Government policies and demand that the Government guarantees compliance of the process.

### **PROPOSALS**

Abraham López, President of ACILAPP, read the proposal that includes 3 strategic lines, which forms part of this Note, for the same to be sent to the competent authorities for their consideration and execution.

Luis Marina Garzón explained that this proposal presented by ACILAPP is not the way in which the Government handles the eradication of illicit crops. The Government's proposal corresponds to Forest Ranger Families and it will lead to possible projects such as food security, FAMILIES IN ACTION, infrastructure, COMPUTERS FOR EDUCATION, and training at SENA.

She referred to the methodology of the proposal presented by the indigenous communities, and said that no reference can be made to costs, or of the magnitude of such petitions. If the program enters the community with the support of social and technical environmental accompaniment and the program itself, they will look for the solution of the major problems of the communities.

Eighteen of the 34 indigenous communities are formed as reservations, 8 of these overlap with the *La Paya* Park area; 4 are under study to be established as a reservation since four years ago, but no answer has yet been received. Therefore, the communities that could make part of the Family Rangers Family would be only 10 of the 34 and this would not be a solution for the community; it is suggested that the Government reviews the proposal.

### **AGREEMENT**

The communities define the time for manual eradication of 45 days, that is, that by the first week of February, the illicit coca crops would be eradicated in the indigenous communities of Puerto Leguízamo and the number of plants contemplated for exclusion for traditional use is the following:

| <b>MAMBEADORES</b>               | <b>MALOQUEROS</b>             |
|----------------------------------|-------------------------------|
| 10 mts x 10 mts for IYAIMA EIMUE | 20 mts x 50 mts for N+MA+RAMA |

In turn, the Government headed by the Ethnic Directorate will take the necessary steps before the competent authorities for them to offer support to the indigenous community of Puerto Leguizamo in Putumayo, including those located inside the *LA PAYA* Park.

#### FOLLOW-UP COMMITTEE

The following will be the follow-up committee:

|  |   |
|--|---|
| FOR THE COMMUNITY                                    | THE GOVERNORS                                 |
| FOR THE INDIGENOUS COUNCILS-ACILAPP                  | THE PRESIDENT OR HIS DELEGATE                 |
| FOR OZIP   | THE OFFICE OF THE PROCURATOR OR THE OMBUDSMAN |
| FOR THE PUBLIC MINISTRY                              | THE ETHNIC DIRECTORATE                        |
| FOR THE National Narcotics Directorate DNE           | DELEGATE                                      |
| FOR THE PRESIDENT OF THE REPUBLIC                    | DELEGATE                                      |
| MINISTRY OF THE ENVIRONMENT, HOUSING AND DEVELOPMENT | DELEGATE                                      |
| Colombian Agriculture and Livestock Institute (ICA)  | DELEGATE                                      |
| ADMINISTRATIVE UNIT OF NATURE PARKS                  | HEAD OF PARK OR TECHNICAL SUBDIRECTORATE      |

Proposal and list of attendees attached.

In witness, this Note is signed on December 21, 2006



PRIOR CONSULTATION – ERADICATION OF ILLICIT CROPS WITH THE  
INDIGENOUS AUTHORITIES OF PUTUMAYO (PUERTO LEGUÍZAMO)

DECEMBER 20 AND 21, 2006

In compliance with Decision SU-383 / 2003 and agreement signed on November 14, 2003 between the Government and the Indigenous Authorities of the Colombian Amazonia.

PARTICIPATING INDIGENOUS AUTHORITIES

| ENTITY   | SIGNATURE |
|--|-----------|
| ADOLFO CABEZAS – <i>AGUAS NEGRAS</i> GOVERNOR                      |           |
| JESUS RIVADENEIRA – <i>LA QUEBRADITA</i> GOVERNOR                  |           |
| LUCY MAR SAN JUAN – <i>KICHWA</i> GOVERNOR, URBAN DISTRICT         |           |
| RODOLFO RODRIGUEZ – <i>MURUL</i> COUNCIL GOVERNOR – URBAN DISTRICT |           |
| FABIO RIVADENEIRA – <i>NARINO</i> MAYOR                            |           |
| ADOLFO MASICAYA - <i>TUKUNARE</i> GOVERNOR                         |           |
| ENOC FAUSTO MONAGA – <i>TABLERO</i> GOVERNOR                       |           |
| FABIO LARRARTE GIL – <i>EL REFUGIO</i> ADVISER                     |           |
| CAMILO TOVAR – TERRITORIAL AREA – <i>ACILAPP</i>                   |           |
| OLIVER ALEXANDER CHARRI – <i>BELLAVISTA</i> GOVERNOR               |           |
| DOMITILA REMUY – <i>COMUYA AMENA</i> COUNCIL - GOVERNESS           |           |
| NILSON ANDOQUE – <i>SAMARITANA</i> GOVERNOR                        |           |
| JESÚS ALVARADO – <i>PINUNA NEGRO</i> GOVERNOR                      |           |
| GUSTAVO SERILLAMA - <i>EL PROGRESO</i> GOVERNOR                    |           |
| JUAN GOMEZ – <i>LAGARTO COCHA</i> GOVERNOR                         |           |
| MARCIAL MACHACURY – <i>CECILIA COCHA</i> GOVERNOR                  |           |
| LORENZO PIANDA – <i>ALTO NAPORUNA</i> GOVERNOR                     |           |

PRIOR CONSULTATION – ERADICATION OF ILLICIT CROPS WITH THE  
INDIGENOUS AUTHORITIES OF PUTUMAYO (PUERTO LEGUÍZAMO)

DECEMBER 20 AND 21, 2006

In compliance with Decision SU-383 / 2003 and agreement signed on November 14, 2003 between the Government and the Indigenous Authorities of the Colombian Amazonia.

PARTICIPATING INDIGENOUS AUTHORITIES

| ENTITY   | SIGNATURE |
|--|-----------|
| ELIECER MUÑOZ – JIRI-JIRI GOVERNOR   |           |
| JESUS RIVADENEIRA – LA QUEBRADITA GOVERNOR                                 |           |
| ELSA NIDIA RIVADENEIRA - PUERTO PUNTALES – GOVERNESS                       |           |
| FREDDY ALVARADO – EL HACHA GOVERNOR  |           |
| BERNARDINO COCA – <i>TAITA EL HACHA</i>                                    |           |
| HECTOR YAIGUAJE COCA<br><i>TAITA – SIONA GAO YA</i>                        |           |
| RODRIGO JITUYAMA<br><i>CACIQUE MURUI URBAN DISTRICT</i>                    |           |
| LIBORIO MUÑOZ – <i>CACIQUE JIRI – JIRI</i>                                 |           |
| JULIO CÉSAR LOPEZ – <i>CACIQUE UMANCIA</i>                                 |           |
| JORGE TORRES – <i>TAITA ALTO NAPORUNA</i>                                  |           |
| MARCELIANO COBETTE – <i>CACIQUE TUKUNARE</i>                               |           |
| CÉSAR ORTEGA PAYAGUAJE – TRADITIONAL PRACTITIONER<br><i>BAJO CASACUNTE</i> |           |
| JESÚS ALVARADO – <i>PINUNA NEGRO</i> GOVERNOR                              |           |
| ADELMO CUELLAR – TRADITIONAL PRACTITIONER - <i>KICHWA</i>                  |           |
| JUAN GOMEZ – <i>LAGARTO COCHA</i> GOVERNOR                                 |           |
| MARCIAL MACHACURY – <i>CECILIA COCHA</i> GOVERNOR                          |           |
| LORENZO PIANDA – <i>ALTO NAPORUNA</i> GOVERNOR                             |           |

PRIOR CONSULTATION – ERADICATION OF ILLICIT CROPS WITH THE  
INDIGENOUS AUTHORITIES OF PUTUMAYO (PUERTO LEGUÍZAMO)

DECEMBER 20 AND 21, 2006

In compliance with Decision SU-383 / 2003 and agreement signed on November 14, 2003 between the Government and the Indigenous Authorities of the Colombian Amazonia.

PARTICIPATING INDIGENOUS AUTHORITIES

| ENTITY  | SIGNATURE |
|---|-----------|
| LUIS HURTADO – <i>BAJO CASACUNTE</i> GOVERNOR                     |           |
| SIEON GASCA – <i>CONSARA</i> GOVERNOR                             |           |
| DEMSE GUZMAN – <i>REFUGIO</i> GOVERNOR                            |           |
| LUIS GUAMAN – <i>LA PLAYA</i> GOVERNOR                            |           |
| CALISTO NUNEZ – <i>LA PLAYA</i> GOVERNOR                          |           |
| RAQUEL HERNANDEZ- TRADITIONAL PRACTITIONER – SANTA RITA           |           |
| JOSE DARIO GUTIERREZ – <i>COREGUAJU</i> LEADER – URBAN DISTRICT   |           |
| JESUS MARIN OLAYA – <i>PUERTO RICO</i> GOVERNOR                   |           |
| WILLIAM YAIGUAJE – <i>SIONA</i> COUNCIL GOVERNOR – URBAN DISTRICT |           |
| PEDRO HERNAN COTE – HUMAN RIGHTS – ACILAPP                        |           |
| CLAUDIO SANCHEZ – INDIGENOUS COORDINATOR                          |           |
| ABRAHAM CESAR LOPEZ – ACILAPP PRESIDENT                           |           |
| LUIS LOPEZ JAMIOY – OZIP PRESIDENT                                |           |

**PRIOR CONSULTATION – ERADICATION OF ILLICIT CROPS WITH THE  
INDIGENOUS AUTHORITIES OF PUTUMAYO (PUERTO LEGUÍZAMO)**

**DECEMBER 20 AND 21, 2006**

In compliance with Decision SU-383 / 2003 and agreement signed on November 14, 2003 between the Government and the Indigenous Authorities of the Colombian Amazonia.

**PARTICIPATING INDIGENOUS AUTHORITIES**

| ENTITY  | SIGNATURE |
|---|-----------|
| ROSA ELENA RAMOS - National Narcotics Directorate DNE                                     |           |
| EDGAR ALONSO DIAZ- MINISTRY OF INTERIOR AND JUSTICE – ETHNIC DIRECTORATE                  |           |
| MY. MIGUEL ANTONIO TUNJANO - National Narcotics Directorate DNE.                          |           |
| JORGE ARTURO RODRIGUEZ – ICA  |           |
| JORGE HERNAN BOTERO TOBON – NATIONAL HEALTH INSTITUTE                                     |           |
| JOSE AGUSTIN ZEA PÉREZ – MINISTRY OF THE ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT |           |
| LUIS ENRIQUE DELGADO-CIFUENTES- TEMPORARY UNION – EMP-DEN audit.                          |           |
| LUIS MARINA GARZON – OFFICE OF THE PRESIDENT - PCI  |           |
| CARLOS NARVAEZ – ENVIRONMENTAL PROGRAM OFFICER – US EMBASSY                               |           |
| NOHORA ROCIO GALLEGOS-SALAS – MINISTRY OF INTERIOR AND JUSTICE -                          |           |

LIST OF ATTENDANCE OF THE PRIOR CONSULTATION PROCESS –  
ERADICATION OF ILLICIT CROPS WITH INDIGENOUS AUTHORITIES OF  
PUTUMAYO (PUERTO LEGUÍZAMO) – 20 AND 21 DECEMBER 2006

In compliance with Decision SU-383 / 2003 and agreement signed on November 14, 2003 between the Government and the Indigenous Authorities of the Colombian Amazonia.

| NAME | ID | TITLE | COMMUNITY | RESERVATION |
|------|----|-------|-----------|-------------|
|      |    |       |           |             |

NOTE OF THE TRANSLATOR:

18 PAGES FOLLOW WITH ABOVE DETAILS IN HADWRITTEN FORM



Ministerio del Interior y de Justicia  
República de Colombia



Dirección  
Nacional de  
Estupefacientes



Policia  
Nacional



Dirección  
Antinarcoóticos



Acción Social

## FIRST PRIOR CONSULTATION MEETING MINUTE –

### ERADICATION OF ILLICIT CROPS WITH INDIGENOUS AUTHORITIES OF NARIÑO (ACIESNA ORGANIZATION)

(SEPTEMBER 4 AND 5, 2007)

In compliance with Decision SU-383/ 2003 and Agreement signed on November 14, 2003 between the Colombian Government and the Indigenous Authorities of the Colombian Amazonia, prior consultation process was conducted as follows:

PLACE: DEPARTMENT OF NARIÑO – MUNICIPALITY OF OLAYA HERRERA  
DATE: 4 AND 5 SEPTEMBER, 2007

#### AGENDA

1. Opening and introduction of attendees.
2. Appointment of translator (if necessary) and of persons to write minutes.
3. Fundamentals and reasons of the prior consultation process – Ministry of Interior and Justice (Ethnic Directorate).  
Introduction of the Constitutional, legal and jurisprudence fundamentals (Decision SU-383 / 2003 of the Constitutional Court) of the Prior Consultation Process for the eradication of coca illicit crops in indigenous territories.
4. Intervention by State entities:
  - ✓ Presentation of the Policy of Fight against Drugs: Entities, political and legal framework.

- ✓ Presentation of Strategies of eradication of illicit crops as measures adopted by the Government to face this issue. Anti-Narcotics Police Directorate.
- ✓ Presentation of the National Policy for Alternative Development. Office of the President. *Acción Social*.

5. Space for authorities and members of indigenous communities
6. Proposals
7. Agreements
8. Designation of the Follow-up Committee
9. Reading and approval of Minutes

### 1. OPENING AND INTRODUCTION OF ATTENDEES

The Ethnic Directorate of the Ministry of Interior and Justice opened the meeting introducing attendants of the various indigenous authorities or their delegates and officers of the various State entities.

#### ATTENDANCE OF INDIGENOUS COMMUNITIES

| NAME                | AUTHORITY OR TITLE           | RESERVATION-COMMUNITY | MUNICIPALITY              |
|---------------------|------------------------------|-----------------------|---------------------------|
| BENEDICTO TOVAR     | GOVERNOR                     | SANQUIANGUITA         | OLAYA HERRERA             |
| MARCIAL PETIARA     | GOVERNOR                     | SANTIAGA              | OLAYA HERRERA             |
| FIDELINO QUINTERO   | GOVERNOR                     | SAN JOSE BACAO        | OLAYA HERRERA             |
| EPIFANO GARABATO    | GOVERNOR                     | QUEBRADA GRANDE       | SANTA BARBARA DE ISCUANDE |
| JOSELINO CHIRIMIA   | GOVERNOR                     | SAN JOSE BACAO        | OLAYA HERRERA             |
| REINALDO MESA       | GOVERNOR                     | SAN JUAN PAMPO        | LA TOLA                   |
| FLORINDO MALAGA     | GOVERNOR                     | INTEGRATED COUNCIL    | EL CHARCO                 |
| LUIS ALBERTO GARCIA | GOVERNOR                     | SAN AGUSTIN           | TUMACO                    |
| ERNESTO GONZALEZ    | GOVERNOR                     | SAN JOSE BACAO        | OLAYA HERRERA             |
| JOSE QUINTERO       | GOVERNOR                     | INTEGRATED COUNCIL    | EL CHARCO                 |
| LORENZO CHIRIMIA    | GOVERNOR                     | MORRITO               | EL CHARCO                 |
| ARTURO BARQUEÑO     | GOVERNOR                     | INTEGRATED COUNCIL    | OLAYA HERRERA             |
| OCTAVIO CAICEDO     | GOVERNOR                     | SANQUIANGA            | EL CHARCO                 |
| RENE DURAN          | GOVERNOR                     | INTEGRATED COUNCIL    | OLAYA HERRERA             |
| FRANCISCO GONZALEZ  | LEGAL REPRESENTATIVE-ACIESNA | SAN JOSE BACAO        |                           |
| HIGINIO OBLISPO     | ONIC DELEGATE                |                       |                           |

ATTENDANTS BY STATE ENTITIES

|                                 |  |
|---------------------------------|--|
| ROSA ELENA RAMOS CASTIBLANCO    | National Narcotics Directorate DNE                               |
| MIGUEL ANTONIO TUNJANO          | ANTI-NARCOTICS POLICE – DIRECTORARTE                             |
| LUIS ALFREDO QUINTERO VELÁSQUEZ | Instituto Colombiano Agropecuario (ICA)                          |
| RICARDO MEDINA                  | OFFICE OF THE PROCURATOR   |
| ALFONSO HERNADEZ                | MINISTRY OF THE ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT |
| LUISA MARINA GARZON             | OFFICE OF THE PRESIDENT – ACCION SOCIAL                          |
| EDGAR ALONSO GALLEGO SALAS      | MINISTRY OF INTERIOR AND JUSTICE- ETHIC DIRECTORATE              |
| NOHORA ROCIO GALLEGO SALAS      | MINISTRY OF INTERIOR AND JUSTICE- ETHIC DIRECTORATE              |

2. Appointment of translator (if necessary) and of the persons to write minutes.

Attendees are asked whether they all understand Spanish or whether they need a translator, attendees say they understand Spanish, but that they need the presence of a translator for accuracy of their expressions, for which purpose, FRANCISCO GONZÁLEZ, President of ACIESNA will act as such.

Minutes will be prepared by the Ethic Directorate of the Ministry of Interior and Justice and HIGINIO OBISPO, as delegate of the Indigenous Organizations present.

3. Fundamentals and reasons of the prior consultation process – Ministry of Interior and Justice (Ethnic Directorate).

The Ethnic Directorate made a detailed presentation of the Prior Consultation Process and its legal framework. Also, it referred to the process in progress, based on an order or judicial mandate of the Constitutional Court in Decision SU-383 / 2003.

To exclude illicit crops in indigenous territories, excluding those of traditional use and ancestral consumption by indigenous communities and to agree with communities the eradication procedure in accordance with State policies implemented for the eradication of illicit crops.



#### 4. Intervention by State entities:

##### NATIONAL NARCOTICS DIRECTORATE (DNE) PRESENTATION OF OVERALL ANTI-DRUG POLICY

Mrs. Rosa Elena Ramos-C. made a detailed explanation of the Overall Anti-Drugs Policy, established in the National Development Plan, with emphasis in State strategies to fight illicit drugs, stressing the need of dismantling production processes, processing, traffic and drug consumption. Explanation of the legal framework of Law 30 / 1986 and Law 599 / 200 of the Criminal Code, where coca-leaf, opium poppy and marihuana crops are established as illegal. Also, stress is made on compliance with decision of Article 4 of the Constitutional Court, respecting ancestral consumption of indigenous communities and implementing State policies for the eradication of illicit crops not used for this purpose.

##### PRESENTATION OF THE OPERATING PART OF PROCEDURE AND FORMS OF ERADICATION. NATIONAL NARCOTICS DIRECTORATE (DNE)

My. Miguel Antonio Tunjano explained the diagnosis and problems of illicit coca-leaf crops in indigenous reservations of Nariño.

He introduced the legal, technical and environmental framework for the development of forcible eradication operations, both aerial and manual.

Additionally, eradication mechanisms taking account of detection processes, aerial spraying, manual eradication and verification.

He also explained the procedure for lodging claims for possible damage to licit crops in the context of the Program for the Eradication of Illicit Crops by Aerial Spraying under Resolution No. 008 / 2007.

He stressed the fact that the police has not undertaken eradication operations of illicit crops within indigenous reservations areas, in accordance with official cartographic information provided by IGAC (Agustín Codazzi Geographic Institute of Colombia) and INCODER.

## 5. SPACE FOR AUTHORITIES AND MEMBERS OF INDIGENOUS COMMUNITIES

Regarding presentation made by the Police, the indigenous communities said that the nine reservations present, equivalent to 15 communities, have had spraying tests with no presence of coca in the indigenous territory where the aerial spraying occurred; My Tunjano explained in more detail the claims procedure, mentioning the competent authority and the 20-days term allowed to file a claim, as of the date of spraying.

Additionally they say that if eradication is conducted correctly, it could be advantageous since it would be eradicating the curse of drug-trafficking, but they claim that since the moment spraying begins, aircraft do not close their valves until completing operations, thus causing damage to the communities, their crops, fauna and flora and soil, the source of their livelihood.

In the case of *Casa Grande* and *Tórtola*, claims were filed immediately to the municipal authorities, and no reply has been received so far.

The existing procedures for claims are difficult, said the mayor of the Olaya Herrera municipality, even more so for river communities. Some people have a video showing the damage caused by aerial spraying to biodiversity in general, and have handed it to the National Narcotics Directorate (DNE) as a claim, but no reply has been so far to this claim for damage caused by glyphosate spraying.

In view of this array of claims, the agencies requested that dates and names should be provided of the individuals who could potentially been affected, for verification.

Additionally, the community expressed its concern for some loans that they obtained from Banco Agrario, for crops which, according to them, were affected by the aerial spraying. Here, the agencies again requested information in order to verify the situation and thus, be able to effect follow-up of the claims filed. Also, the Anti-Narcotics Police stressed that no spraying has been conducted in indigenous reservations.

Regarding the reservation's dispute about mapping, it was suggested that the community might consider the possibility of sending a "right of petition" to INCODER, for it to provide plans with the location of existing reservations in the region in order to be able to unify official information and information existing in the communities.

The community made some observations regarding its ancestral wisdom regarding medicine and food, and spoke against logging and spraying; What has the Ministry of the Environment thought in the ambit of its responsibility for the protection of biodiversity as World Heritage, understanding the world view as an equal relationship of man with nature?

Regarding this appreciation, the Ministry of the Environment argued that it strictly follows the Environmental Management Plan, both as to the verification of spraying operations and as to claims filed under the context of the Plan.

The indigenous community expressed its concern for the presence of a person who does not belong to the Prior Consultation process, who arrived in the second group of the Commission with unknown intentions; and that the indigenous communities were not consulted on the matter, this person made an unauthorized tour within the community and tried to engage in an activity that the community knew absolutely nothing about.

The agencies replied that this person was making surveys and effectively, he was told not to interact with the community in the course of this task.

The community describe their life plan, "LET US RESUME OUR PATHS" (*tachi ode t'tadama*) and with concerns such as health problems and basic sanitation (according to the needs of the SIA culture), education (according to SIA culture), land titles and clearance of reservations (they ask the Commission to be introduced to Incoder), uncontrolled exploitation of timber resources, lack of strategies of territorial order, contamination of rivers and timber exploitation, amongst others.

Reassuming the objective of Prior Consultation, apart from coca for ancestral, traditional and medicinal use, the community has started an alternative option of productive projects, there is no coca in their territories and what the Police has presented is a previous map; today, there are no coca-leaf crops, since aerial spraying has finished with them; there are just a few plants in the mountain but they are dying; the community is engaged in the implementation of crops for their living and development. This is different from the crops of persons who do not belong to the indigenous community and who may have illicit coca-leaf crops.

The representative of *Acción Social* explained the measures that INCODER must take against occupiers of indigenous reservations who might have illicit crops.

Regarding these projects, except for the Forest Ranger Families (*familias guardabosques*) other Ministries should participate to support the Plan of Life, and therefore, they request the Plan to be sent to the Ministries which could support them and not to leave this situation alone, but to make the expectations of participant communities a reality.

## 6. **PROPOSALS**

The community requested the Commission to secure State support to strengthen their Plan of Life, clarifying that the communities decided autonomously before prior consultation, that they would effect the voluntary eradication of their illicit coca-leaf crops that are currently in their territory. Regarding illicit crops of settlers, that is, persons who do not belong to the indigenous communities but live inside the indigenous territory and who may own illicit coca-leaf crops, it is the State's responsibility to eradicate these crops by means of the eradication strategies it has available.

The community has exercised what is called "Social Control", which they will control themselves for "no more".

## 7. **AGREEMENTS**

- ✓ The indigenous communities present will continue with the voluntary manual eradication of coca illicit crops that exist inside their reservations and of their property; this process could be verified in the first week of December, when they will inform the number of coca plants necessary for the preservation of their ancestral, cultural and medicinal traditions.
- ✓ The National Narcotics Directorate (DNE) will request to the National Narcotics Council of Nariño a space to present the Community's Plan of Life. This presentation will be made during one of the meetings of the Regional Narcotics Council with the Community invited as invitee.

- ✓ Regarding illicit crops of settlers, that is, persons who do not belong to the indigenous communities, the eradication of coca illicit crops is responsibility of the State, to be dealt with under strategies authorized for the purpose.
- ✓ The consultation team will ask INCODER to verify the legal situation of the indigenous reservations, in particular, the situation of coca illicit crops, for clearing purposes of their reservations.
- ✓ Should there occur any adverse effects on food crops due to PECIG application, the community will take recourse to Resolution No. 008 of the Narcotics Council for compensation of damages caused.

## 8. APPOINTMENT OF THE FOLLOW-UP COMMITTEE

|  |  |
|--|--|
| FOR THE PUBLIC MINISTRY  | THE OFFICE OF THE GENERAL PROCURATOR<br>(DELEGATE FOR HUMAN RIGHTS AND ETHNICAL MATTERS) |
| FOR THE MINISTRY OF INTERIOR AND JUSTICE                         | THE ETHNIC DIRECTORATE   |
| THE NATIONAL NARCOTICS COUNCIL                                   | DELEGATE   |
| OFFICE OF THE PRESIDENT – ACCION SOCIAL                          | DELEGATE   |
| MINISTRY OF THE ENVIRONMENT, HOUSING AND TERRITORIAL DEVELOPMENT | DELEGATE   |

## 9. READING AND APPROVAL OF MINUTES

These minutes as read and signed by those who took part in it.

### INDIGENOUS COMMUNITIES

| NAME              | AUTHORITY OR TITLE | RESERVATION    | MUNICIPALITY  | SIGNATURE         |
|-------------------|--------------------|----------------|---------------|-------------------|
| BENEDICTO TOVAR   | GOBERNADOR         | SANQUIANGUITA  | OLAYA HERRERA | Benedicto Tovar   |
| MARCIAL PETIARA   | GOBERNADOR         | SANQUIANGA     | OLAYA HERRERA | Marcial Petiara   |
| FIDELINO QUINTERO | GOBERNADOR         | SAN JOSE BACAO | OLAYA HERRERA | Fidelino Quintero |

| NAME                | AUTHORITY OR TITLE          | RESERVATION       | MUNICIPALITY              | SIGNATURE                  |
|---------------------|-----------------------------|-------------------|---------------------------|----------------------------|
| EPIFANO GARABATO    | GOBERNADOR                  | QUEBRADA GRANDE   | SANTA BARBARA DE ISCUANDE | <i>Epifanio Garabato</i>   |
| JOSELINO CHIRIMIA   | GOBERNADOR                  | SAN JOSE BACAO    | OLAYA HERRERA             | <i>Jh.</i>                 |
| REINALDO MESA       | GOBERNADOR                  | SAN JUAN PAMPO    | LA TOLA                   | <i>Reinaldo Mesa</i>       |
| FLORINDO MALAGA     | GOBERNADOR                  | CABILDO INTEGRADO | EL CHARCO                 | <i>Florindo Malaga</i>     |
| LUIS ALBERTO GARCIA | GOBERNADOR                  | SAN AGUSTIN       | TUMACO                    | <i>Luis Alberto Garcia</i> |
| ERNESTO GONZALEZ    | GOBERNADOR                  | SAN JOSE BACAO    | OLAYA HERRERA             | <i>Ernesto Gonzalez</i>    |
| JOSE QUINTERO       | GOBERNADOR                  | CABILDO INTEGRADO | EL CHARCO                 | <i>Jose Quintero</i>       |
| LORENZO CHIRIMIA    | GOBERNADOR                  | MORRITO           | EL CHARCO                 | <i>Lorenzo Chirimia</i>    |
| ARTURO BARQUEÑO     | GOBERNADOR                  | CABILDO INTEGRADO | EL CHARCO                 | <i>Arturo Barqueño</i>     |
| OCTAVIO CAICEDO     | GOBERNADOR                  | SANQUIANGA        | OLAYA HERRERA             | <i>Octavio Caicedo</i>     |
| RENE DURAN          | GOBERNADOR                  | CABILDO INTEGRADO | EL CHARCO                 | <i>Rene Duran</i>          |
| FRANCISCO GONZALEZ  | REPRESENTANTE LEGAL ACIESNA | SAN JOSE BACAO    | OLAYA HERRERA             | <i>Francisco Gonzalez</i>  |
| HIGINIO OBISPO      | DELEGADO ONIC               |                   |                           |                            |

**STATE AND ENFORCEMENT ENTITIES**

| NAME OF OFFICER                 | ENTITY   | SIGNATURE |
|---------------------------------|--|-----------|
| ROSA ELENA RAMOS C              | National Narcotics<br>Directorate DNE                    |           |
| MIGUEL ANTONIO TUNJANO          | National Narcotics<br>Directorate DNE                    |           |
| LUIS ALFREDO QUINTERO-VELASQUEZ | ICA  |           |
| RICARDO MEDINA                  | OFFICE OF THE PROCURATOR                                 |           |
| ALFONSO HERNÁNDEZ               | MINISTRY OF THE ENVIRONMENT                              |           |
| LUISA MARINA GARZÓN             | OFFICE OF THE PRESIDENT –<br>ACCION SOCIAL               |           |
| EDGAR ALONSO DIAZ ROJAS         | MINISTRY OF INTERIOR AND<br>JUSTICE – ETHNIC DIRECTORATE |           |
| NOHORA ROCIO GALLEGOS SALAS     | MINISTRY OF INTERIOR AND<br>JUSTICE – ETHNIC DIRECTORATE |           |

[13 APR 2007]



**Ministry for the Environment, Housing and Territorial Development**  
Licenses, Permits and Environmental Procedures Division  
Republic of Colombia

**Bogotá, D.C.**

**ORDER No. [0917]**

**“Whereby a monitoring is performed and other decisions are made”**

**THE ADVISOR OF THE DEPUTY MINISTER FOR THE ENVIRONMENT  
LICENSES, PERMITS AND ENVIRONMENTAL PROCEDURES DIVISION**

In exercise of the powers under Resolution No. 802 of May 10, 2006, and

**WHEREAS**

By Resolution 1065 of November 26, 2001, the Ministry for the Environment, today the Ministry for the Environment, Housing and Territorial Development, imposed the Environmental Management Plan submitted by the National Narcotics Directorate - DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country.

By Resolution 108 of January 31, 2002, this Ministry confirmed Resolution 1065 of November 26, 2001, imposing the Environmental Management Plan submitted by the National Narcotics Directorate - DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country.

By Resolution 099 of January 30, 2003, the Ministry partially amended Resolution 1065 of November 26, 2001, in the sense of embracing the recommendation of the Colombian Agriculture and Livestock Institute - ICA, for the temporary increase in the dose of commercial formulation of glyphosate used in the eradication of illicit crops, within the framework of the eradication of illicit crops by aerial spraying.

By Resolution 1054 of September 30, 2003, the Ministry amended Resolutions 1065 of November 26, 2001 and 108 of January 31, 2002, by which it imposed an Environmental Management Plan on the National Narcotics Directorate –DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country, in the sense of adjusting the Records of the Environmental Management Plan.

By Resolution 509 of May 6, 2004, the Ministry amended Resolution 099 of January 30, 2003, in the sense of granting an extension of one hundred twenty days (120) for delivery of the required information by the decision under appeal.

By official letter No. OF106 - 30460 - DET - 1000, Dr. SORELLY PAREDES-VARGAS, of the Office of Ethnic Affairs of the Ministry of The Interior and Justice, reported the



completion of consultation with indigenous communities in the municipality of Puerto Asis, Putumayo within the framework of activities of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG.

The Office of the Director of Licenses, Permits and Environmental Procedures Division of the Ministry for the Environment, Housing and Territorial Development, in exercise of its functions of monitoring and control and in order to verify compliance with Ruling SU-383 of 2003 of the Honorable Constitutional Court, accompanied the process of consultation with indigenous communities in the municipality of Puerto Asis in the province of Putumayo, within the framework of the activities of the Environmental Management Plan of Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate -PECIG and issued the Technical Opinion 26 on January 18, 2007, which stated:

### **DEVELOPMENT OF ACTIVITIES**

*“In development of the environmental monitoring process that the Ministry for the Environment, Housing and Territorial Development performs on the various PECIG activities and in compliance with Ruling SU-383 of the Honorable Constitutional Court, the consultation process with indigenous communities in the municipality of Puerto Asis, Putumayo was conducted.*

*“For this process the following were also summoned: the Anti-Narcotics Police, the external audit of the eradication Program, the Municipal representative of Puerto Asis, the National Narcotics Directorate - DNE, the Colombian Agriculture and Livestock Institute - ICA, officials of Social Action of the Presidency of the Republic, and the National Health Institute.*

**Consultation dates:** 13 and 14 December 2006

**Geographic Area of the Consultation:** indigenous communities of the municipality of Puerto Asis, province of Putumayo.

### **Members of the Commission:**

- Doctor Gabriel Gutierrez Diaz: National Narcotics Directorate - DNE
- Diego Orozco Gómez, engineer: Colombian Agriculture and Livestock Institute - ICA
- Major Miguel Tunjano: Coordinator Verification Group, Anti-Narcotics Police - DIRAN
- Lt. Colonel Luis Mendez: Anti-Narcotics Police - DIRAN
- Luis Delgado, engineer: External environmental audit
- Dr. Edgar Diaz: Ministry of the Interior and Justice - Office of Ethnic Affairs
- Dr. Nohora Gallego: Ministry of the Interior and Justice - Office of Ethnic Affairs
- José Agustín Zea, engineer: Ministry for the Environment, Housing and Territorial Development
- Doctor Jorge Botero: National Health Institute
- Mrs. Courtney Beale: Environment Officer - U.S. Embassy
- Doctor Gustavo Vargas: Technical Advisor - U.S. Embassy
- Dr. Luz Bany Zambrano: Indigenous Affairs Promoter - Justice house, Puerto Asis

- Doctor Andres Gallego: Office of the High Commissioner for Social Action  
 - Dr. Uldarico Ramirez Advisor for Social Action

*“In pursuance of the provision in Ruling SU-383 of 2003 and the agreement signed on 14 November 2003 between the Government and the indigenous authorities of the Colombian Amazon, the consultation process took place with indigenous communities in the municipality of Puerto Asis, Putumayo; the attendance list appears in the formalization record of the consultation, attached to the Technical Opinion 28 of January 20, 2007.*

*“The process took place between 13 and 14 December this year. On the first day the inauguration and opening of the consultation process occurred and the agenda was established for the next day. The second day there was the socialization process, starting with the presentation of the general drug policy by the National Narcotics Directorate. Subsequently the DIRAN presented the spraying operation and procedure and forms of illicit crop eradication in the country.*

*“The National Health Institute presented the health impact of the program for the eradication of illicit crops, for which a protocol has been established for monitoring of pesticide poisoning, ending this part of the socialization with the environmental impact of the program for the eradication of illicit crops, with follow-up of the Environmental Management Plan Records; finally the Office of Social Action of the Presidency of the Republic presented the actions that are being developed concerning the Ranger family program, International cooperation - AID, through the ADAM program and alternative development programs.”*

Finally the Department of Licenses, Permits and Environmental Procedures of this Ministry, through the Technical Opinion 26 of January 18, 2007, concluded that:

*“As a result of consultation with indigenous communities in the municipality of Puerto Asis, Putumayo province, an Act was signed between the parties involved, that is, indigenous authorities and entities of the state, where they agreed to a term of two (2) months to arrange with their communities, and to present to the national government a proposal to establish the method and the terms of the eradication of illicit crops, and two (2) months to eradicate, that is, that by the first of May there should be no illicit cultivation in the indigenous territory of Puerto Asis, Putumayo. Likewise, the exclusion areas for the medicinal use of coca plants will be respected and a monitoring committee will be set up comprising the Ministry of The Interior and Justice, Office of Ethnic Affairs, the Public Ministry, the National Narcotics Directorate, two (2) delegates of the Indian community (OCIMPA-OZIP), the Ministry for the Environment, Housing and Territorial Development and the Anti-Narcotics Police.*

The opinion issued by the Ministry concluded:

1. *As a result of consultation with indigenous communities in the municipality of Puerto Asis. Putumayo Province, a term of two (2) months was agreed to arrange with their communities and to present the national government a proposal to establish the method and terms of eradication of illicit crops in the indigenous territory of Puerto Asis in Putumayo, and two (2) months to eradicate illicit crops, that is, by the first of May there should be no illicit cultivation in indigenous territory of Puerto Asis, Putumayo.*

2. *Similarly, it was agreed with the indigenous communities of the municipality of Puerto Asis, Putumayo, that the Program for the Eradication of illicit crops will respect exclusion areas for the medicinal use of coca plants.*
3. *Given a Monitoring Committee was established of which is part the Ministry for the Environment, Housing and Territorial Development, the Ministry of The Interior and Justice-Office of Ethnic Affairs, the National Narcotics Directorate and the Anti-Narcotics Police were recommended to timely inform this Ministry about the holding of meetings of that committee, in order to achieve an effective accompaniment to them.*
4. *“Part of this Technical Opinion 28 of January 20, 2007 is the copy of the formalization Minutes of the previous consultation - the eradication of illicit crops, with the indigenous authorities of the municipality of Puerto Asis, Putumayo.*

### **LEGAL CONSIDERATIONS**

Article 8 of the Constitution states: *“It is the duty of the state and individuals to protect the cultural and natural wealth of the Nation.”*

Articles 79 and 80 of the Constitution enshrine the right of all to enjoy a healthy environment, and to community participation in decisions that may affect it. It also establishes that the State, among others, has the duty to protect biodiversity and environmental integrity, as well as the State’s obligation to plan for the management and use of renewable natural resources to ensure sustainable development, conservation, restoration and replacement.

Article 95 paragraph 8 of the rule cited above states that it is the duty of citizens to *“protect the natural and cultural resources of the country and ensure the preservation of a healthy environment.”*

Through the issuance of Law 99 of 1993, the Government created the Ministry for the Environment (now Ministry for the Environment, Housing and Territorial Development), reorganized the public sector responsible for the management and conservation of the environment and renewable natural resources, organized the National Environmental System - SINA, and issued other provisions.

Article 5 paragraph 35 of Law 99 of 1993 notes that within the functions of this Ministry is the assessment, monitoring and control of environmental risk factors and those that may affect the occurrence of natural disasters, and coordinate with other relevant authorities the activities designed to prevent the emergence or impede the extent of their effects.

By the issuance of Decree 1220 of April 21, 2005, the Ministry for the Environment, Housing and Territorial Development regulated Title VIII of Law 99 of 1993.

Likewise, Decree 1220 of April 21, 2005 established in article 33 the duty of the environmental authority to control and monitor projects, works or activities subject to environmental permit or Environmental Management Plan during construction, operation, decommissioning or abandonment.

In accordance with the considerations made by the Office of the Director of Licensing, Permits and Environmental Procedures through Technical Opinion 26 of January 18, 2007, it will be declared, through the operative part of this administrative act, that the Presidency of the Republic, the Ministry of The Interior and Justice, the National Health Institute, the Agriculture and Livestock Institute ICA, the National Narcotics Directorate and the Antinarcotics Police - DIRAN, together with this Ministry, performed the process of prior consultation with the Buenavista Reservation, La Italia Reservation, Pinuna Blanco Reservation, Santa Elena Town Council, Inga Town Council, Los Pastos Town Council, Moniya Amena Town Council and the Indigenous Zonal Organization - OZIP and the OCIMPA Organization, located in the municipality of Puerto Asis in Putumayo province as ordered by the Honorable Constitutional Court through SU-383 of 2003 Decision, in the implementation of activities under the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG.

Notwithstanding the foregoing and in accordance with the considerations made by the Department of Licenses, Permits and Environmental Procedures through the Technical Opinion 26 of January 18, 2007, it will be required, through the operative part of this administrative act, of the Ministry of The Interior and Justice - Office of Ethnic Affairs, the National Narcotics Directorate - DNE and the Anti Narcotics Police - DIRAN, to report promptly and previously to this Ministry, the performance of meetings of the Monitoring Committee set up to verify development of agreements with the Buenavista Reservation, La Italia Reservation, Pinuna Blanco Reservation, Santa Elena Town Council, Inga Town Council, Los Pastos Town Council, Moniya Amena Town Council and the Indigenous Zonal Organization - OZIP and the OCIMPA Organization.

Decree 216 of February 3, 2003 defines the objectives, the structure of the Ministry for the Environment, Housing and Territorial Development and other provisions. In its article 2, it states that the Ministry for the Environment, Housing and Territorial Development will continue to exercise powers under Law 99 of 1993.

By Article Three of Decree 3266 of October 8, 2004, the Ministry for the Environment, Housing and Territorial Development created the Department of Licenses, Permits and Environmental Procedures, attached to the Office of the Deputy Minister for the Environment.

According to the provisions of Decree 802 of May 10, 2006 of the Ministry for the Environment, Housing and Territorial Development, it is the responsibility of the Advisor of the Office of the Deputy Minister of Environment – Division to sign this administrative act.

In virtue of the foregoing,

## **DECIDES**

**ARTICLE ONE.** To declare that the Presidency of the Republic, through the Social Action Office, the Ministry of The Interior and Justice, this Ministry, the National Health Institute, the Agriculture and Livestock Institute-ICA, the National Narcotics Directorate and Antinarcotics Police - DIRAN together with the Ministry, undertook the process of prior consultation with the Buenavista Reservation, La Italia Reservation, Pinuna Blanco Reservation, Santa Elena Town Council, Inga Town Council, Los Pastos Town Council, Moniya Amena Town Council and the Indigenous Zonal Organization - OZIP and the OCIMPA Organization located in the municipality of Puerto Asis in Putumayo province, in accordance with the order by the Honorable Constitutional Court through SU-383 Decision

of 2003 in the implementation of activities under the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG, in accordance with what is stated in the preamble of this administrative act.

**ARTICLE TWO.** To require the Ministry of The Interior and Justice - Office of Ethnic Affairs, the National Narcotics Directorate -DNE and the Antinarcotics Police - DIRAN, to report to this ministry promptly and prior to conducting meetings of the Committee for Monitoring the agreements with the Buenavista Reservation, La Italia Reservation, Pinuna Blanco Reservation, Santa Elena Town Council, Inga Town Council, Los Pastos Town Council, Moniya Amena Town Council and the Indigenous Zonal Organization - OZIP and the OCIMPA Organization in accordance with what is discussed in the preamble of this administrative act.

**ARTICLE THREE.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representatives of the Social Action Office of the Presidency of the Republic, the Anti-Narcotics Police – DIRAN, the National Narcotics Directorate, the National Health Institute, the Agriculture and Livestock Institute - ICA and/or the duly appointed attorneys.

**ARTICLE FOUR.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representative of FUNDEPUBLICO, on Dr. Claudia Sampedro-Torres, Dr. Héctor Suárez and/or the duly appointed attorneys.

**ARTICLE FIVE.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representatives of the Ombudsman and/or the duly appointed attorney.

**ARTICLE SIX.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Delegate Prosecutor for Environmental and Agricultural Affairs, the Ministry of Social Protection, the National Narcotics Council-CNE and the Geographic Institute Agustín Codazzi - IGAC.

**ARTICLE SEVEN.** There is recourse for reversal against this decision, by government means, and recourse must be filed within five (5) days following service of this notice and with full compliance of Articles 50, 51 and 52 of the Administrative Code

**BE THIS SERVED, COMMUNICATED AND OBEYED**

*[Signed]*

**NILBERCECE MACÍAS-FERNÁNDEZ**

Advisor to the Deputy Minister for the Environment  
Department of Licenses, Permits and Environmental Procedures

Exp. 793  
Draft: Camilo Rincon, professional contractor, Department of Licenses, Permits and Environmental Procedures  
C/Mis Documentos/Culivos Ilicitos/seguimiento CT26 del 18 de enero de 2007/ Exp 793

*[Translator's note:*

*The stamp that appears on the first page, 13 APR 2007, appears on pages 2, 3, 4, and 5;*

*The stamp that appears on the first page, 0917, appears on pages 2, 3, 4, 5, 6 and 7]*

[13 APR 2007]

**Ministry for the Environment, Housing and Territorial Development**  
Licenses, Permits and Environmental Procedures Division  
Republic of Colombia

**Bogota, D.C.**

**ORDER No. [0918]**

**“Whereby a monitoring is performed and other decisions are made”**

**THE ADVISOR OF THE DEPUTY MINISTER FOR THE ENVIRONMENT  
LICENSES, PERMITS AND ENVIRONMENTAL PROCEDURES DIVISION**

In exercise of the powers under Resolution No. 802 of May 10, 2006, and

**WHEREAS**

By Resolution 1065 of November 26, 2001, the Ministry for the Environment, today the Ministry for the Environment, Housing and Territorial Development, imposed the Environmental Management Plan submitted by the National Narcotics Directorate - DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country.

By Resolution 108 of January 31, 2002, this Ministry confirmed Resolution 1065 of November 26, 2001, imposing the Environmental Management Plan submitted by the National Narcotics Directorate - DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country.

By Resolution 099 of January 30, 2003, the Ministry partially amended Resolution 1065 of November 26, 2001, in the sense of embracing the recommendation of the Colombian Agriculture and Livestock Institute - ICA, for the temporary increase in the dose of commercial formulation of glyphosate used in the eradication of illicit crops, within the framework of the eradication of illicit crops by aerial spraying.

By Resolution 1054 of September 30, 2003, the Ministry amended Resolutions 1065 of November 26, 2001 and 108 of January 31, 2002, by which it imposed an Environmental Management Plan on the National Narcotics Directorate –DNE for the activity called Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG in the country, in the sense of adjusting the sheets of the Environmental Management Plan.

By Resolution 509 of May 6, 2004, the Ministry amended Resolution 099 of January 30, 2003, in the sense of granting an extension of one hundred twenty days (120) for delivery of the required information through the decision under appeal.

By official letter No. OF106 - 30460 - DET - 1000, filed in this Ministry under No. 4120-E1-634 of January 4, 2007, Ms. SORELLY PAREDES-VARGAS, of the Office of Ethnic Affairs of the Ministry of the Interior and Justice, reported the completion of consultation with indigenous communities in the municipality of Puerto Leguizamo, province of Putumayo within the framework of activities of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG.

Article Two of Ruling SU-383 of 2003 of the Honorable Constitutional Court ordered the President of the Republic, the Ministries of The Interior and Justice, and for the Environment, Housing and Territorial Development, the National Narcotics Council and each of its members, the National Narcotics Directorate and the National Police to consult effectively and efficiently with indigenous and tribal peoples of the Colombian Amazon on decisions relating to the Program for the Eradication of Illicit Crops that these entities conduct in their territories, on the issues for which each of these entities is responsible *“in order to reach an agreement or be granted approval of the proposed measures”* in full compliance with the principles and rules contained in the ILO Agreement 169, ratified by Law 21 of 1991.

The Office of the Director of Licenses, Permits and Environmental Procedures Division of the Ministry for the Environment, Housing and Territorial Development, in exercise of its functions of monitoring and control and in order to verify compliance with Ruling SU-383 of 2003 of the Honorable Constitutional Court, accompanied the process of consultation with indigenous communities in the municipality of Puerto Leguizamo in the province of Putumayo, within the framework of the activities of the Environmental Management Plan of Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate -PECIG and issued the Technical Opinion 29 of January 2007, which stated:

### **1. DEVELOPMENT OF ACTIVITIES**

*“In development of the environmental monitoring process that the Ministry for the Environment, Housing and Territorial Development performs on the various PECIG activities and in compliance with Ruling SU-383 of the Honorable Constitutional Court, the consultation process with indigenous communities in the municipality of Puerto Leguizamo, Putumayo was conducted.*

*“For this process the following were also summoned: the Anti-Narcotics Police, the external audit of the eradication Program, the Colombian Agriculture and Livestock Institute - ICA, the National Narcotics Directorate - DNE, officials of Social Action of the Presidency of the Republic, and the National Health Institute.*

**Consultation dates:** 20 and 21 December 2006

**Geographic Area of the Consultation:** the municipality of Puerto Leguizamo, province of Putumayo.



**Members of the Commission:**

- Doctor Rosa Elena Ramos: National Narcotics Directorate - DNE
- Jorge Rodríguez, engineer: Colombian Agriculture and Livestock Institute - ICA
- Major Miguel Tunjano: Coordinator Verification Group, Anti-Narcotics Police - DIRAN
- Luis Delgado, engineer: External environmental audit
- Dr. Edgar Díaz: Ministry of the Interior and Justice - Office of Ethnic Affairs
- Dr. Nohora Gallego: Ministry of the Interior and Justice - Office of Ethnic Affairs
- José Agustín Zea, engineer: Ministry for the Environment, Housing and Territorial Development
- Doctor Jorge Botero: National Health Institute
- Col Carlos Narvaez: Technical Advisor - U.S. Embassy
- Doctor Luz Marina Garzón: Office of the High Commissioner for Social Action

*“In pursuance of the provision in Ruling SU-383 of 2003 in connection with the prior consultation with indigenous communities in the framework of the PECIG activities and the agreement signed on 14 November 2003 between the Government and the indigenous authorities of the Colombian Amazon, the consultation process took place with indigenous communities of the municipality of Puerto Leguizamo, province of Putumayo; the attendance list appears in the formalization record of the consultation, attached to the Opinion 29 of January 20, 2007.*

*“The consultation process took place between 20 and 21 December this year. On the first day the inauguration and opening of the consultation process occurred and the socialization process started with each of the entities committed with the process. The National Narcotics Directorate presented the general drug policy; subsequently the DIRAN presented the spraying operation and procedure and forms of illicit crop eradication in the country.*

*“The National Health Institute presented the health impact of the program for the eradication of illicit crops, for which a protocol has been established for monitoring of pesticide poisoning. The officer of the Ministry for the Environment, Housing and Territorial Development presented the environmental impact of the program for the eradication of illicit crops, with follow-up of the Environmental Management Plan sheets; finally the Office of Social Action of the Presidency of the Republic presented the actions that are being developed concerning the Ranger family program, International cooperation - AID, through the ADAM program and alternative development programs.”*

Finally the Department of Licenses, Permits and Environmental Procedures of this Ministry, through the Technical Opinion 29 of January 2007, concluded that:

*“As a result of consultation with indigenous communities in the municipality of Puerto Leguizamo, Putumayo province, an Act was signed between the parties involved, that is, indigenous authorities and entities of the state, where they agreed to a term of forty-five (45) days to eradicate the illicit crops, that is, that by the first week of February there should be no*

*illicit cultivation in the indigenous territory of Puerto Leguizamo – Putumayo. Likewise, exclusion areas corresponding to medical use of coca plants will be respected and a follow-up committee comprised of the Ministry of Interior and Justice, the national Narcotics Directorate, two (2) delegates of the indigenous community (ACILAPP-OZIP), the Ministry for the Environment, Housing, and Territorial Development, the Anti-Narcotics Direction of the National Police, and The Colombian Agriculture and Livestock Institute – ICA.”*

The technical Opinion issued by this Ministry concluded:

1. *“As a result of the consultation carried out with the indigenous communities of Puerto Leguizamo Municipality, province of Putumayo, a 45-day term was agreed on to eradicate coca crops, i.e., by the first week of February there will be no illicit crops in the following indigenous reserves, located within the Puerto Leguizamo Municipality, province of Putumayo:*

1.1. *“Coca-leaf Chewers Culture (Murui): Chewers culture (Murui): Piñuña Negro, Aguas Negras, Tukunare, Lagarto Cocha, Samaritana, Santa Rita, Umancia, Progreso, Nuevo Amanecer, Jiri-Jiri, Comuya Amena, Murui-urban center, Refugio, Puerto Nariño-Murui, Bella Vista, Yarinal and La Primavera.*

1.2. *“Yage Culture (Kichua and Siona): Ato Naporuna, Calarcá, La Paya, Bajo Remanso, Bajo Kasacunte, Puerto Rico, El Hacha, El Tablero, Cecilia Cocha, Inga Kichwa, Puerto Nariño-Kichwa, Puntales, Consara, Nasakiwe, Nukanchipayata, Gaoya, La Perecera and Quebradita.*

2. *“Likewise, it was agreed with the with the indigenous communities of Puerto Leguizamo Municipality, province of Putumayo, that the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate –PECIG, will respect the exclusion areas corresponding to medical use of coca plants, which, according to the Minute signed, corresponds to an area of 10 by 10 meter for coca-leaf chewers and 20 by 50 meters for Yage users.*

3. *Given that a Follow-up committee was created, which the Ministry for the Environment is part of, it is recommended to the Ministry of Interior and Justice, the Anti-Nartics Direction of National Police to inform to this Ministry about the meetings to be held by such Committee in order to have an effective participation in those meetings.*

4. *A copy of the Prior Consultation Protocol Minute – eradication of illicit crops with indigenous authorities of of Puerto Leguizamo Municipality, province of Putumayo, is part of the Technical Opinion 29 of 20 January 2007.*

## **LEGAL CONSIDERATIONS**

Article 8 of the National Constitution states: “It is a duty of the State and its Citizens to protect the cultural and natural richness of the Nation.”

Articles 79 and 80 of the Constitution enshrine the right of all to enjoy a healthy environment, and to community participation in decisions that may affect it. It also establishes that the State, among others, has the duty to protect biodiversity and environmental integrity, as well as the State's obligation to plan for the management and use of renewable natural resources to ensure sustainable development, conservation, restoration and replacement.

Article 95 paragraph 8 of the rule cited above states that it is the duty of citizens to *“protect the natural and cultural resources of the country and ensure the preservation of a healthy environment.”*

Through the issuance of Law 99 of 1993, the Government created the Ministry for the Environment (now Ministry for the Environment, Housing and Territorial Development), reorganized the public sector responsible for the management and conservation of the environment and renewable natural resources, organized the National Environmental System - SINA, and issued other provisions.

Article 5 paragraph 35 of Law 99 of 1993 notes that within the functions of this Ministry is the assessment, monitoring and control of environmental risk factors and those that may affect the occurrence of natural disasters, and coordinate with other relevant authorities the activities designed to prevent the emergence or impede the extent of their effects.

By the issuance of Decree 1220 of April 21, 2005, the Ministry for the Environment, Housing and Territorial Development regulated Title VIII of Law 99 of 1993.

Likewise, Decree 1220 of April 21, 2005 established in article 33 the duty of the environmental authority to control and monitor projects, works or activities subject to environmental permit or Environmental Management Plan during construction, operation, decommissioning or abandonment.

In accordance with the considerations made by the Office of the Director of Licensing, Permits and Environmental Procedures through Technical Opinion 29 of January 2007, it will be declared, through the operative part of this administrative act, that the Presidency of the Republic, the Ministry of The Interior and Justice, the National Health Institute, the Agriculture and Livestock Institute ICA, the National Narcotics Directorate and the Antinarcotics Police - DIRAN performed the process of prior consultation with the Coca-leaf Chewers culture (Murui): Piñuña Negro, Aguas Negras, Tukunare, Lagarto Cocha, Samaritana, Santa Rita, Umancia, Progreso, Nuevo Amanecer, Jiri-Jiri, Comuya Amena, Murui-urban center, Refugio, Puerto Nariño-Murui, Bella Vista, Yarinal and Primavera and the Yagé culture (Kichwa and Siona): Ato Naporuna, Calarcá, La Paya, Bajo Remanso, Bajo Kasacunte, Puerto Rico, El Hacha, El Tablero, Cecilia Cocha, Inga Kichwa, Puerto Nariño-Kichwa, Puntales, Consara, Nasakiwe, Nukanchipayata, Gaoya, La Perecera and Quebradita, located in the municipality of Puerto Leguizamo in the province of Putumayo as ordered by the Honorable Constitutional Court through Ruling SU-383 of 2003, in the implementation of activities under the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG.

Notwithstanding the foregoing and in accordance with the considerations made by the Department of Licenses, Permits and Environmental Procedures through the Technical Opinion 29 of January 2007, it will be required, through the operative part of this administrative act, of the Ministry of The Interior and Justice - Office of Ethnic Affairs, the National Narcotics Directorate - DNE and the Anti Narcotics Police - DIRAN, to report promptly and previously to this Ministry, the performance of meetings of the Monitoring Committee set up to verify development of agreements with the Chewers culture (Murui) and the Yagé culture (Kichwa and Siona).

Decree 216 of February 3, 2003 defines the objectives, the structure of the Ministry for the Environment, Housing and Territorial Development and other provisions. In its article 2, it states that the Ministry for the Environment, Housing and Territorial Development will continue to exercise powers under Law 99 of 1993.

By Article Three of Decree 3266 of October 8, 2004, the Ministry for the Environment, Housing and Territorial Development created the Department of Licenses, Permits and Environmental Procedures, attached to the Office of the Deputy Minister for the Environment.

According to the provisions of Decree 802 of May 10, 2006 of the Ministry for the Environment, Housing and Territorial Development, it is the responsibility of the Advisor of the Office of the Deputy Minister of Environment – Division to sign this administrative act.

In virtue of the foregoing,

### **DECIDES**

**ARTICLE ONE.** To declare that the Presidency of the Republic, through the Social Action Office, the Ministry of the Interior and Justice, this Ministry, the National Health Institute, the Agriculture and Livestock Institute-ICA, the National Narcotics Directorate and Antinarcotics Police – DIRAN, undertook the process of prior consultation with the the coca-leaf Chewers culture (Murui): Piñuña Negro, Aguas Negras, Tukunare, Lagarto Cocha, Samaritana, Santa Rita, Umancia, Progreso, Nuevo Amanecer, Jiri-Jiri, Comuya Amena, Murui-urban center, Refugio, Puerto Nariño-Murui, Bella Vista, Yarinal and Primavera and the Yagé culture (Kichwa and Siona): Ato Naporuna, Calarcá, La Paya, Bajo Remanso, Bajo Kasacunte, Puerto Rico, El Hacha, El Tablero, Cecilia Cocha, Inga Kichwa, Puerto Nariño-Kichwa, Puntales, Consara, Nasakiwe, Nukanchipayata, Gaoya, La Perecera and Quebradita, located in the municipality of Puerto Leguizamo in the province of Putumayo as ordered by the Honorable Constitutional Court through Ruling SU-383 of 2003, in the implementation of activities under the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate - PECIG, in accordance with what is stated in the preamble of this administrative act.

**ARTICLE TWO.** To require the Ministry of the Interior and Justice - Office of Ethnic Affairs, the National Narcotics Directorate -DNE and the Antinarcotics Police - DIRAN, to report to this ministry promptly and prior to conducting meetings of the Monitoring Committee in accordance with what is discussed in the preamble of this administrative act.

**ARTICLE THREE.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representatives of the Social Action Office of the Presidency of the Republic, the Anti-Narcotics Police – DIRAN, the National Narcotics Directorate, the National Health Institute, the Agriculture and Livestock Institute - ICA and/or the duly appointed attorneys.

**ARTICLE FOUR.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representative of FUNDEPUBLICO, on Dr. Claudia Sampedro-Torres, Dr. Héctor Suárez and/or the duly appointed attorneys.

**ARTICLE FIVE.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of the contents of this administrative act on the Legal Representatives of the Ombudsman and/or the duly appointed attorney.

**ARTICLE SIX.** Through the Department of Licenses, Permits and Environmental Procedures of this Ministry, to serve notice of this administrative act on the Delegate Prosecutor for Environmental and Agricultural Affairs, the Ministry of Social Protection, the National Narcotics Council-CNE and the Geographic Institute Agustín Codazzi - IGAC.

**ARTICLE SEVEN.** There is recourse for reversal against this administrative act, by government means, and recourse must be filed within five (5) days following service of this notice and with full compliance of Articles 50, 51 and 52 of the Administrative Code

**BE THIS SERVED, COMMUNICATED AND OBEYED**

*[Signed]*

**NILBERCECE MACÍAS-FERNÁNDEZ**

Advisor to the Deputy Minister for the Environment  
Department of Licenses, Permits and Environmental Procedures

File 793

Draft: Camilo Rincon, professional contractor, Department of Licenses, Permits and Environmental Procedures  
C:/Mis Documentos/Culivos Ilicitos/seguimiento CT29 de enero de 2007/ Exp 793

**Annex 44**

**ECUADORIAN FOREIGN MINISTRY COURT FILING NO. 937-2004,  
22 OCTOBER 2004**

*(Ministry of Foreign Affairs of the Republic of Ecuador, pp. 6-7, 18-24, 31-40)*



**REPUBLIC OF ECUADOR**  
**MINISTRY OF FOREIGN AFFAIRS**

Information Access Action No. 937-2004

[...]

Presidential Decree 1151 Official Gazette 238 of December 23, 2003

[...]

Art. 2: To create an Inter-Institutional Commission formed by the ministries of the Environment, Public Health, Foreign Affairs, Agriculture and Animal Husbandry, Government and National Defense, representatives of the provincial councils of the provinces of Sucumbíos, Orellana, Carchi, Imbabura and Esmeraldas and a representative from each one of the municipalities of the border populations.

Art. 3: The Inter-Institutional Commission shall have the following powers:

- a. To design an environmental and health control and alert system for avoiding the use of chemical and biochemical substances or biological agents in the control and eradication of marihuana, coca and poppy crops that could affect the environment, farming production, fish-farming production and public health of border populations of the provinces of Sucumbíos, Orellana, Esmeraldas, Carchi and Imbabura;

[Page 6]

- b. To craft an early alert mechanism in said provinces for preventing the potential risks from the use of chemical, biochemical or biological agents harmful to the environment, farming production and fish-farming production or the health of Ecuadorian populations;

- c. To compile, systematize and analyze technical-scientific information on the use of chemical, biochemical or biological agents as fumigation mechanisms;

- d. To organize campaigns for developing money-making legal crops as a measure to discourage the border population from taking part in the production of drug crops; and,

- e. To spread information to the community on the potential impacts of future fumigations.

...

[Page 7]



[...]

**Technical report on visit to the Province of Sucumbíos (border with Colombia)**

**February 27-29, 2004**

**Gustavo Bernal  
Soil Microbiologist Ph.D.  
CCTE Commissioner**

**Recitals**

With the knowledge that the Human Rights Commission of the Honorable National Congress had programmed a visit to verify the existing problems of the border populations of the Province of Sucumbíos, probably caused by residue from glyphosate sprayed in Colombian territory, the engineer Oscar Izquierdo of the Chancellor's Office invited the members on the CCTE to join the commission in its visit of the area, in accordance with the pre-established visit agenda of the Human Rights Commission. Consequently, the agronomists Gustavo Bernal Ph.D., Edwin Cáceres M.Sc. and Rubén Tamayo M.Sc. accepted the invitation and participated in the visit by the Human Rights Commission of the Honorable National Congress during the period February 27 to 29, 2004.

**Activities carried out at:**

Puerto Mestanza

- 1) Samples of soil taken from the Puerto Mestanza area, following the recommendations of the Soil Department Laboratory (DMSA) of the INIAP Santa Catalina Station.
- 2) Samples of plants taken following the INIAP Plant Protection Department (DNPV) laboratory. Mandarin leaves and fruits were collected and had the following symptoms: curled leaves with light chlorotic spots and fruits with thick surfaces and a wrinkled appearance.

**Corazón Orense**

- 3) Receipt of plant samples provided by community members. It is necessary to emphasize that the plant samples were not collected directly by the professional members on the CCTE. The samples were taken from plantain, yucca, orange, lemon, cacao and maize plants.

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## **Santa Marianita**

4) Receipt of vegetable samples provided by community members. Furthermore, the samples taken from this place (plantain, yucca, orange, lemon and cacao plants) were not collected directly by CCTE members.

5) Observation of symptoms or type of damage.

The plantain plants from both places had dark colored fruit, covered by a layer of white and orange mycelium. Necrosis was observed (black colored decay) when cutting the fruit stalk.

The yucca was long and thin with white colored mycelium.

The orange plants had black spots on both sides of the leaves. There were areas with light brown necrosis.

The lemon plant had abundant lichens.

The cacao had very dark spots gradually covering the entire bean surface.

The maize plants had deformed ears, smaller than usual containing small, irregular shaped grains.

## **Lab analysis**

Both the soil samples and plant samples were taken to the DMSA and DNPV laboratories at the INIAP Santa Catalina Station for analyses, following routine procedures.

### **Analysis of soil samples**

The soil taken to the lab was subjected to chemical analyses focusing on the contents of macro nutrients: nitrogen (N); phosphorous (P), potassium (K), sulfur (S); calcium (Ca), magnesium (Mg), and micro nutrients: zinc (Zn), copper (Cu), iron (Fe), manganese (MN), boron (B). In addition, the following were determined: sodium concentrations (Na), and aluminum (Al), soil ph (acidity), cationic interchange capacity (CIC), and organic material content (MO).

### **Analysis of plant samples**

The plant samples were subjected to microbiological analyses: Plant fragments showing the described symptoms were taken and placed in appropriate culture

[Page 19]

means for growing fungi and bacteria. The routine procedure recommended by the DNPV was followed.

## Results and Discussion

Analysis of soil samples collected from the Puerto Mestanza area.

Based on the (attached) analytical report, the soil lacks nutrients, showing an imbalance thereof. The soil is acidic (pH 5.4), which is characteristic of the Amazon area. The soil acidity makes absorption of major elements (Nutrients) lower and complete inhibition possible. Complementarily, acidity increases absorption of minor elements, such as iron (Fe). The report clearly shows a high concentration of iron and aluminum, which are indicia of toxicity of these elements, inhibiting the absorption of calcium and creating a low cationic interchange capacity typifying deteriorated soil. Crops in these conditions fail to grow normally and do not produce fruits in their normal shapes and sizes, considerably reverberating on performance and productivity. A clear example is maize with small ears of corn and small, irregular shaped grains, which are the consequences of the soil's poor nutritional value.

The soil also shows an excess of potassium with respect to other macro nutrients of importance, such as nitrogen and phosphorous, causing an imbalance for proper plant absorption. The results also show deficiencies of Zinc and Boron, which are important micro nutrients for the proper functioning of plant enzymes. The symptoms observed in fruit plants, specifically mandarin, are closely related with the soil's deficient nutrients.

Finally, the organic matter content (1.40%) is very low, constituting yet another indicator of the poor quality of the soil collected from the Mestanza area. Poor soil, in organic matter terms, is a sign of the physical, chemical and biological deterioration of the soil. Under these conditions, and together with deficient and/or toxic nutrients, performance and productivity are severely affected, yielding small and deformed fruit as in the case of maize and yucca. Furthermore, the result is a weak and underdeveloped crop that is largely susceptible to damage by pathogenic microorganisms.

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## Phytosanitary analyses

| Crop     | Analyzed part | Pathogens  |
|----------|---------------|--|
| Plantain | Fruit         | <i>Colletotrichum sp.</i><br><i>Verticillium sp.</i> |
| Yucca    | Root          | <i>Cladosporium sp.</i>                              |
| Orange   | Leaves        | <i>Phitomyces sp.</i><br><i>Endophragmia sp.</i>     |
| Lemon    | Leaves        | <i>Cladosporium sp.</i>                              |
| Cacao    | Fruit         | <i>Phytophthora sp.</i>                              |

The phytosanitary analysis performed at the lab shows that the symptoms observed in the crop samples provided by community members of the areas of Corazón Orense and Santa Marianita are the result of fungal damage. Generally, the fungi identified are crop pathogens. In the case of *Cladosporium*

*sp* in yucca, and *Endophragmia sp* in oranges, these are saprophytes which are organisms that feed on dead plants.

### Summary

The soil of the Puerto Mestanza area is poor, showing a nutritional imbalance along with aluminum and iron toxicity.

The acidity of the soil from the Puerto Mestanza area makes it indispensable to engage in fertility management practices that neither increase soil acidity nor deteriorate soil further.

The symptoms observed in cultured mandarin at the Mestanza area are the result of the soil's nutritional imbalance (deficiencies and toxicities).

The symptoms observed in cultured maize from the Corazón Orense area are also the result of the soil's poor nutritional value.

The symptoms observed in the samples of plantain, yucca, oranges, lemons and cacao, provided by the farmers of the Corazón Orense and Santa Marianita areas, are the result of the damage caused by pathogenic fungi (see chart), determined by laboratory procedures.

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INIAP

AUTONOMOUS NATIONAL INSTITUTE  
OF FARMING RESEARCH  
SANTA CATALINA EXPERIMENTAL STATION  
NATIONAL PLANT PROTECTION DEPARTMENT

Telefax 690.693

### PLANT DISEASE DIAGNOSIS

| ENTRY INFORMATION |                  |               |                     |         |
|-------------------|------------------|---------------|---------------------|---------|
| Diagnosis No.     | Type of analysis | Date of Entry | Payment Voucher No. | TIN No. |
|                   | Mycologic        | 27-01-04      |                     |         |

| SENDER'S INFORMATION |            |     |
|----------------------|------------|-----|
| Name of Sender:      |            |     |
| Company:             |            |     |
| Location:            |            |     |
| Address:             | Telephone: | Fax |

| CROP CHARACTERISTICS          |                 |             |
|-------------------------------|-----------------|-------------|
| <b>Crop:</b> Plantain, yucca, | <b>Variety:</b> | <b>Age:</b> |

|                      |  |             |
|----------------------|--|-------------|
| orange, lemon, cacao |  |             |
| Development status:  |  | Prior crop: |
| Crop system:         |  |             |
| Crop management      |  |             |

| DESCRIPTION OF DISEASE   |  |
|--|--|
| Plant parts affected:  |  |
| Intensity of disease:  |  |
| Distribution of disease:   |  |
| Possible cause of disease:   |  |
| <p>Symptoms or type of damage:</p> <p>Plantain: dark colored rotting in the fruit, covered with a film of whitish and orange mycelium. Black necrosis was observed when cutting the fruit stalk.</p> <p style="text-align: center;">[Page 22]</p> <p>Yucca: Whitish mycelium observed at the base of the yucca.</p> <p>Orange: Black spots were observed on both sides of leaves. There were also light brown necrotic areas.</p> <p>Lemon: Abundant lichens present</p> <p>Cacao: Extensive dark colored spots were observed in the fruit, progressively covering the entire surface of the cocoa bean.</p> |  |
| <p>Additional observations:</p> <p>Samples from crops located in the Amazon border with Colombia.</p>  |  |

## RESULTS

| Crop  | Part Analyzed | Pathogen (Fungi)                                   |
|---|---------------|--|
| Plantain  | Fruit         | <i>Colletotrichum</i> sp<br><i>Verticillium</i> sp |
| Yucca   | Roots         | <i>Cladosporium</i> sp                             |
| Orange  | Leaves        | <i>Phitomyces</i> sp<br><i>Endophragmia</i> sp     |
| Lemon   | Leaves        | <i>Cladosporium</i> sp                             |
| Cacao   | Fruit         | <i>Phytophthora</i> sp                             |
| <p><b>Observations:</b><br/>The identified fungi are generally crop pathogens, in the case of <i>Cladosporium</i> sp in yucca and <i>Endophragmia</i> sp in orange the fungi are saprophytes.</p> |               |  |

[Page 23]

[...]

**INIAP****“SANTA CATALINA” EXPERIMENTAL STATION  
SOIL AND WATER MANAGEMENT LABORATORY**Km 14 ½ Panamericana Sur. Apdo 17-01-340  
Quito-Ecuador Tel: 690-691/92/93 Fax: 690-693**SOIL ANALYTICAL REPORT**

|  |   |
|--|---|
| <b>OWNER INFORMATION</b><br>Name: BORDER CONTAMINATION<br>Address:<br>City:<br>Telephone:<br>Fax:                        | <b>PROPERTY INFORMATION</b><br>Name: PUERTO MESTANZA<br>Province:<br>Canton:<br>Parish:<br>Location: BORDER-COLOMBIA                              |
| <b>LOT INFORMATION</b><br>Current Crop:<br>Prior Crop:<br>Prior Fertilizer:<br>Surface:<br>Identification: JUNGLE BORDER | <b>FOR LABORATORY USE</b><br>Report No.: 2,893<br><i>(illegible)</i> 0<br>Date of Sample: 01/03/04<br>Entry Date: 01/03/04<br>Exit Date: 11/03/04 |

| Nutrient         | Value  | Unit       |  |  |  |  |  |  |
|------------------|--------|------------|--|--|--|--|--|--|
| N                | 37.00  | ppm        |  |  |  |  |  |  |
| P                | 9.00   | ppm        |  |  |  |  |  |  |
| S                | 6.90   | ppm        |  |  |  |  |  |  |
| K                | 1.30   | meq/100 ml |  |  |  |  |  |  |
| Ca               | 2.90   | meq/100 ml |  |  |  |  |  |  |
| Mg               | 1.10   | meq/100 ml |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| Zn               | 2.50   | ppm        |  |  |  |  |  |  |
| Cu               | 4.50   | ppm        |  |  |  |  |  |  |
| Fe               | 197.00 | ppm        |  |  |  |  |  |  |
| Mn               | 5.40   | ppm        |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| B                | 0.40   | ppm        |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| pH               | 5.40   |            |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| Acid Int. (Al+H) | 3.70   | meq/100 ml |  |  |  |  |  |  |
| Al               |        | meq/100 ml |  |  |  |  |  |  |
| Na               | 0.03   | meq/100 ml |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| CE               | 0.23   | mmhos/cm   |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |
| MO               | 1.40   |            |  |  |  |  |  |  |
|                  |        |            |  |  |  |  |  |  |

| Ca  | Mg  | Ca+Mg | (meq/100ml) | %    | ppm | (%)  |       |      | Texture<br>Type |
|-----|-----|-------|-------------|------|-----|------|-------|------|-----------------|
| Mg  | K   | K     | Σ Base      | Ntot | Cl  | Sand | Slime | Clay |                 |
| 2.6 | 0.8 | 3.1   | 9.0         |      |     |      |       |      |                 |

*(Signed)*

RESPONSIBLE LABORATORY

*(Signed)*

LAB TECHNICIAN

[Page 24]

ECUADORIAN ATOMIC ENERGY COMMISSION (CEEA)  
ECOTOXICOLOGY  
RESIDUE ANALYSIS LABORATORY

ANALYTICAL REPORT

**Applicant:** Ecuadorian Scientific-Technical Commission (CTE)  
**Samples of:** Water  
**Sampled by:** CEEA Ecotoxicology Lab.  
**Number of Samples:** 4  
**Date of entrance into laboratory:** 15 July 2004  
**Date of sample processing:** 28 July – 2 August 2004  
**Date of Instrumental Analysis:** 15 August 2004  
**Date of issuance of report:** 16 August 2004

| Sample Code                            | Quantified Glyphosate | Concentration µg/L |
|--|-----------------------|--------------------|
| <b>Sample 1</b><br>La Chiquita Ravine  | No residue found      |                    |
| <b>Sample 2</b><br>Chiquita Marshlands | No residue found      |                    |
| <b>Sample 3</b><br>Guadolito Affluent  | No residue found      |                    |
| <b>Sample 4</b><br>Sabalera Marshlands | No residue found      |                    |

**Quantification Limit:**  
Glyphosate 2 µg/L

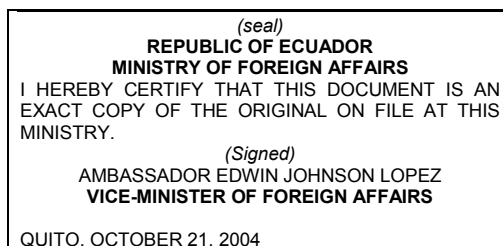
[Page 31]

**Notes:**

1. The results of this report are exclusively for the analyzed samples consisting of 4 samples of water taken at the Province of Esmeraldas (San Lorenzo – Mataje Zone) for Glyphosate residue analysis by CEEA technical personnel on July 14, 2004.
2. The analysis method used is EPA 547 modified glyphosate residue analysis confirmed in the laboratory. For the extraction, 200 ml of water was concentrated in rotavapor up to two milliliters. The analysis was performed using Varian 9010 chromatograph liquid equipped with a post-column derivatization PICKERING PCX 5200, SHIMADZU RF-551 fluorescence detector and Hewlett Packard HP 3392 series II integrator. For identification and quantification, analytical standards provided by Riedel de Haën were followed.
3. Confidential document for use by the “Ecuadorian Scientific-Technical Commission.” This document cannot be reproduced in whole or part without authorization from the laboratory.
4. The samples referred to in this report shall remain in custody for 15 days following the issuance of this report and will be discarded thereafter.
5. The laboratory is not liable for the interpretation of these results.
6. The data associated with this study (chromatograms, calibration curves, etc.) will be kept under custody for a time period of six months following the issuance of the report. The data will be subsequently discarded.
7. **Analyzed Compound:** Glyphosate

*(Signed)*

Laboratory Technician Responsible  
for Residue Analysis  
Chemist Ramiro Castro  
LARPA-AC-136 R-16/08/04



[Page 32]



ECUADORIAN ATOMIC ENERGY COMMISSION (CEEA)  
ECOTOXICOLOGY  
RESIDUE ANALYSIS LABORATORY

ANALYTICAL REPORT

**Applicant:** Ecuadorian Scientific-Technical Commission (CTE)  
**Samples of:** Water  
**Sampled by:** CEEA Ecotoxicology Lab.  
**Number of Samples:** Three  
**Date of entrance into laboratory:** 24 April 2004  
**Date of sample processing:** 27 April 2004  
**Date of Instrumental Analysis:** 4 May June 2004  
**Date of issuance of report:** 11 June 2004

| Sample Code                          | Quantified Glyphosate | Concentration $\mu\text{g/L}$ |
|--------------------------------------|-----------------------|-------------------------------|
| <b>Mataje (1)</b><br>Marshlands      | No residue found      |                               |
| <b>Mataje (2)</b><br>River           | No residue found      |                               |
| <b>Mataje (3)</b><br>(Potable water) | No residue found      |                               |

**Quantification Limit:**  
Glyphosate 2  $\mu\text{g/L}$

[Page 33]

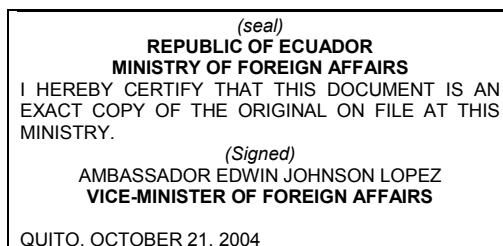
**Notes:**

1. The results of this report are exclusively for the analyzed samples consisting of 6 samples of water taken at the Province of Sucumbíos for Glyphosate residue analysis by CEEA technical personnel on April 24, 2004.
2. The analysis method used is EPA 547 modified glyphosate residue analysis confirmed in the laboratory. For the extraction, 200 ml of water was concentrated in rotavapor up to two milliliters. The analysis was performed using Varian 9010 chromatograph liquid equipped with a post-column derivatization PICKERING PCX 5200, SHIMADZU RF-551 fluorescence detector and Hewlett Packard HP 3392 series II integrator. For identification and quantification, analytical standards provided by Riedel de Haën were followed.
3. Confidential document for use by the "Ecuadorian Scientific-Technical Commission." This document cannot be reproduced in whole or part without authorization from the laboratory.
4. The samples referred to in this report shall remain in custody for 15 days following the issuance of this report and will be discarded thereafter.
5. The laboratory is not liable for the interpretation of these results.
6. The data associated with this study (chromatograms, calibration curves, etc.) will be kept under custody for a time period of six months following the issuance of the report. The data will be subsequently discarded.
7. **Analyzed Compound:** Glyphosate

*(Signed)*

Laboratory Technician Responsible  
for Residue Analysis

LARPA-AC-123a R-11/06/04



[Page 34]

ECUADORIAN ATOMIC ENERGY COMMISSION (CEEA)  
ECOTOXICOLOGY  
RESIDUE ANALYSIS LABORATORY

ANALYTICAL REPORT

**Applicant:** Ecuadorian Scientific-Technical Commission (CCTE)  
**Samples of:** Water  
**Sampled by:** CEEA Ecotoxicology Lab.  
**Number of Samples:** Six  
**Date of entrance into laboratory:** 15 May 2004  
**Date of sample processing:** 20 May 2004  
**Date of Instrumental Analysis:** 9 June 2004  
**Date of issuance of report:** 11 June 2004

| Sample Code  | Quantified Glyphosate | Concentration $\mu\text{g/L}$ |
|--|-----------------------|-------------------------------|
| <b>AG001</b><br><b>Conejo River</b>                    | No residue found      |                               |
| <b>AG002</b><br><b>San Francisco 1</b>                 | No residue found      |                               |
| <b>AG003</b><br><b>San Miguel Bridge</b>               | No residue found      |                               |
| <b>AG004</b><br><b>La Punta Marshlands</b>             | No residue found      |                               |
| <b>AG005</b><br><b>Chone 1</b>                         | No residue found      |                               |
| <b>AG006</b><br><b>Chone 2</b><br><b>Zancudo River</b> | No residue found      |                               |

**Quantification Limit:**  
Glyphosate 2  $\mu\text{g/L}$

[Page 35]

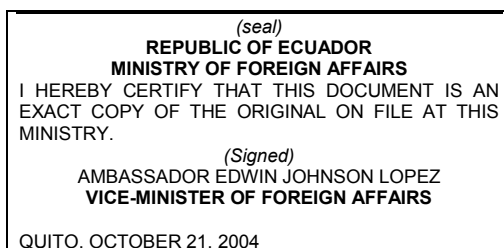
**Notes:**

1. The results of this report are exclusively for the analyzed samples consisting of 6 samples of water taken at the Province of Sucumbíos for Glyphosate residue analysis by CEEA technical personnel on May 14, 2004.
2. The analysis method used is EPA 547 modified glyphosate residue analysis confirmed in the laboratory. For the extraction, 200 ml of water was concentrated in rotavapor up to two milliliters. The analysis was performed using Varian 9010 chromatograph liquid equipped with a post-column derivatization PICKERING PCX 5200, SHIMADZU RF-551 fluorescence detector and Hewlett Packard HP 3392 series II integrator. For identification and quantification, analytical standards provided by Riedel de Haën were followed.
3. Confidential document for use by the “Ecuadorian Scientific-Technical Commission.” This document cannot be reproduced in whole or part without authorization from the laboratory.
4. The samples referred to in this report shall remain in custody for 15 days following the issuance of this report and will be discarded thereafter.
5. The laboratory is not liable for the interpretation of these results.
6. The data associated with this study (chromatograms, calibration curves, etc.) will be kept under custody for a time period of six months following the issuance of the report. The data will be subsequently discarded.
7. **Analyzed Compound:** Glyphosate

*(Signed)*

Laboratory Technician Responsible  
for Residue Analysis

LARPA-AC-123 R-11/06/04



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INIAP

AUTONOMOUS NATIONAL INSTITUTE  
OF FARMING RESEARCH  
SANTA CATALINA EXPERIMENTAL STATION  
NATIONAL PLANT PROTECTION DEPARTMENT

Telefax 690.693

PLANT DISEASE DIAGNOSIS

| <b>ENTRY INFORMATION</b> |                                   |               |                     |         |
|--------------------------|-----------------------------------|---------------|---------------------|---------|
| Diagnosis No.            | Type of analysis                  | Date of Entry | Payment Voucher No. | TIN No. |
|                          | Mycologic<br>and<br>Bacteriologic | 27-01-04      |                     |         |

| <b>SENDER'S INFORMATION</b>                    |            |     |
|--|------------|-----|
| Name of Sender: Ecuadorian Chancellor's Office |            |     |
| Company:                                       |            |     |
| Location:                                      |            |     |
| Address:                                       | Telephone: | Fax |

| <b>CROP CHARACTERISTICS</b> |                 |             |
|-----------------------------|-----------------|-------------|
| <b>Crop:</b> various        | <b>Variety:</b> | <b>Age:</b> |
| Development status:         |                 | Prior crop: |
| Crop system:                |                 |             |
| Crop management             |                 |             |

| <b>DESCRIPTION OF DISEASE</b>  |             |
|--|-------------|
| Plant parts affected:  | leaves      |
| Intensity of disease:  | medium      |
| Distribution of disease:   | entire leaf |
| Possible cause of disease:   | fungi       |
| Symptoms or type of damage:  |             |
| <b>M1:</b> Pasto (small plant) and   |             |
| <b>M2:</b> Pasto (large plant) Reddish foliar necrosis was observed in both samples.     |             |
| <b>M3: Place La Cadena 8 Km from the border.</b> Several black elongated spots observed. |             |
| [Page 37]  |             |

**M4: Place La Cadena 8 Km from the border:** Small, dark, irregular spots were observed on the other plant. Some of the spots connect affecting the major part of the foliar lamina.

**M5:** Light brown necrosis on top and edges of leaves.

**M6 (Labeled as sample 2 photo 7)** Necrosis along the edges of leaves.

**M7:** Plantain: Slight necrosis

**M8: Sample photo 5.**

**Additional observations:**

Samples from crops located on the border with Colombia.

### RESULTS

| Crop | Part Analyzed | Pathogen (Fungi)                                |
|------|---------------|---|
| M1   | Leaves        | -----   |
| M2   | Leaves        | -----   |
| M3   | Leaves        | -----   |
| M4   | Leaves        | <i>Byopolaris sp</i><br><i>Heterosporium sp</i> |
| M5   | Leaves        | -----   |
| M6   | Leaves        | <i>Helminthosporium sp</i>                      |
| M7   | Leaves        | <i>Mycosphaerella sp</i>                        |
| M8   | Leaves        | -----   |

**Observations:**

Generally, identified fungi cause foliar spots.

**DR. GUSTAVO BERNAL G.**

RESP. FOR PLANT PROTECTION DEPT.  
AREA

**DR. MARIA LUISA INSUASTI A.**

RESP. FOR LABORATORY

## RESULTS

| Methodology (Medium)  | Analyzed Sample | Dilution         | Pathogen (Fungi)  | No. Colonies     |
|---|-----------------|------------------|---|------------------|
| PDA-CMA-EMA   | Soil            | 10 <sup>-4</sup> | <i>Penicillium</i> sp<br><i>Cephalosporium</i> sp<br><i>Cylindrocarpon</i> sp                   | 2<br>1<br>1      |
| Methodology (Medium)  | Analyzed Sample | Dilution         | Pathogen (Bacteria)   | No. Colonies     |
| KB-SX-LPGA-CVP  | Soil            | 10 <sup>-4</sup> | <i>Xanthomonas</i> spp<br><i>Bacterionema</i> sp<br><i>Erwinia</i> sp<br><i>Pseudomonas</i> spp | 2<br>2<br>0<br>2 |
| Methodology (Medium)  | Analyzed Sample | Dilution         | Pathogen (Fungi)  | No. Colonies     |
| PDA-CMA-EMA   | Water           | 10 <sup>-4</sup> | -----   | -----            |
| Methodology (Medium)  | Analyzed Sample | Dilution         | Pathogen (Bacteria)   | No. Colonies     |
| KB-SX-LPGA-CVP  | Water           | 10 <sup>-4</sup> | <i>Pseudomonas</i> sp<br><i>Xanthomonas</i> sp<br><i>Erwinia</i> sp                             | 1<br>0<br>0      |
| <b>Observations:</b>  |                 |                  |   |                  |
| <p><b>DR. GUSTAVO BERNAL G. A.</b><br/>RESP. FOR PLANT PROTECTION DEPT.<br/>AREA</p> <p><b>DR. MARIA LUISA INSUASTI</b><br/>RESP. FOR LABORATORY AREA</p> |                 |                  |   |                  |

Discussion:

The plant analysis results (charts) show the presence of pathogenic fungi in sample 4 (*Bypolarys sp.*, and *Heterosporium sp.*). In sample No. 6, the presence of the fungus *Helminthosporium sp.* fungus was identified; and, in sample 7, the *Mycospherella sp.* fungus was identified. All of the identified fungi cause foliar spots.

There was symptomatology of small spots along leaf edges that did not show pathogens. These samples were sent to the INIAP Soil Laboratory (Santa Catalina Station) for foliar analysis and verification of deficiencies or toxicities of nutrients in the foliar part of the samples (results to be issued). Part of the samples was also sent to the Ecuadorian Atomic Energy Commission (CEEA) for foliar analysis and to verify the presence of any kind of agro-chemical concentrations. These results must be forwarded by CEEA. Furthermore, symptoms apparently provoked by hydric deficiency in crops were observed. Following the analysis, soil pathogens were identified in the soil samples (see chart) which cause radical diseases in crops such as bacteria genera *Erwinia*, *Xanthomonas*, etc. The soil samples were also sent to CEEA for analysis and detection of agro-chemicals.

**With respect to these plant and soil samples**, at present final conclusions cannot be issued until foliar and soil results are analyzed at CEEA, and all results are analyzed as a whole. The symptomatology observed in the plant samples may be the result of several causes: pathogens, toxicity (e.g., “nutrients” or agro-chemicals) or nutritional deficiencies (to be verified) and hydric stress.

|   |
|---|
| <p>(<i>seal</i>)</p> <p><b>REPUBLIC OF ECUADOR</b><br/> <b>MINISTRY OF FOREIGN AFFAIRS</b></p> <p>I HEREBY CERTIFY THAT THIS DOCUMENT IS AN<br/> EXACT COPY OF THE ORIGINAL ON FILE AT THIS<br/> MINISTRY.</p> <p>(<i>Signed</i>)</p> <p>AMBASSADOR EDWIN JOHNSON LOPEZ<br/> <b>VICE-MINISTER OF FOREIGN AFFAIRS</b></p> <p>QUITO, OCTOBER 21, 2004</p> |
|---|

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**Annex 45**

**COMMISSION ON TRANSPARENCY AND TRUTH FOR THE ANGOSTURA  
CASE, REPORT, QUITO, DECEMBER 2009**

*(Ministry of Foreign Affairs of the Republic of Ecuador, p.93, 95)*



Report of the Commission on Transparency and Truth for the  
Angostura Case, Quito, December 2009

[Page 93]

“For example, nearby the geodesic line that connects the Putumayo and San Miguel Rivers (border between the two countries in the Sucumbios region) drug processing laboratories, permanent and mobile camps, weapons and fuel storage facilities have been established. Along that border, 42 illegal crosses can be found.”

“The Sucumbios Province is used as an operations center by the FARC’s 48 and 32 fronts. Front 29 has influence in Carchi and Esmeraldas. Whereas in Esmeraldas (Ecuadorian province in the west of the common border) other groups emerging from paramilitarism such as Los Rastrojos, Nueva Generación, Las Aguilas Negras and Los Zorros fight with blood and iron for control of precursors, weapons and drugs cargos.”

[Page 95]

As stated before, the efforts made to control smuggling and drug-trafficking are still insufficient. Despite controls, interinstitutional committees, citizens security boards, police and army patrolling, customs check points, etc., smuggling and drug-trafficking continue to increase.

As an example: in a day and night time monitoring of the main and secondary access roads carried out by the investigation team in the sector located between Puerto El Carmen as far as river Access to Puerto Libre de San Lorenzo, activities such as clandestine sale of white gasoline, caustic soda, drugs, Liquefied petroleum gas, timber, irregular land ownership, late records of displaced people, vehicles theft, paid-killing, etc. were corroborated.”



**Annex 46**

**UNITED STATES EMBASSY IN BOGOTÁ, CERTIFICATION WITH REGARD  
TO PILOTS' TRAINING, FROM THE NAS DIRECTOR, JAMES B. STORY,  
TO THE COLOMBIAN MINISTRY OF FOREIGN AFFAIRS,  
27 SEPTEMBER 2011**

*(United States Embassy in Bogotá, 2011)*



[Seal]

Embassy of the United States of America

Bogotá, D.C.  
27 September, 2011  
Ambassador  
Sonia Pereira  
Coordinator Affairs before the International Court of Justice  
Ministry of Foreign Affairs  
San Carlos Palace  
Bogotá, D.C.

Your Excellency:

We are pleased to greet you and wish you success at your work.

In reply to your kind request, we inform you that the fixed-wing pilots engaged in our program for eradication of illicit crops have to take the Apart (Annual Proficiency And Readiness Test). This test includes, besides the basic aerial skills, the aerial operations tasks and the CRM (Crew Resource Management).

The assessment criteria are established based on knowledge of the ATM (Aircrew Training Manual). The test is developed and designed to keep an optimal training and performance level and to standardize the technical procedures used by spray pilots. Besides the aforementioned test, a skill test is applied without prior notice at least once a year.

Likewise, an annual evaluation of spraying accuracy has been implemented to ensure that pilots keep their capacity to apply the chemical correctly from the aircraft. This is an evaluation carried out in a simulated and controlled environment with the highest criterion of real scenarios.

Additionally, every six months, training on the Environmental Management Plan is given. During this training, required parameters for optimal and environmentally safe application are reviewed.



With the training to the pilots group and its corresponding tests, a greater awareness of the product application is guaranteed in order to reduce likely causes that influence accuracy errors.

We avail of this opportunity to renew to you our high consideration and respect.

Sincerely,

[Signed]  
James B. Story  
Director  
Narcotics Affairs Section - NAS

**Annex 47**

**UNITED STATES INTERAGENCY COMMITTEE FOR AVIATION POLICY,  
AVIATION RESOURCE MANAGEMENT SURVEY TEAM, EVALUATIVE  
ARMS REPORT OF THE UNITED STATES DEPARTMENT OF STATE  
BUREAU FOR INTERNATIONAL NARCOTICS AND LAW AVIATION  
DIVISION, CONDUCTED AUGUST 24 THROUGH SEPTEMBER 2, 1998,  
DOCUMENT A2A, 3 SEPTEMBER 1998**

*(United States Embassy in Bogotá, 2011, p. 1, 7)*



UNCLASSIFIED

INTERAGENCY COMMITTEE FOR AVIATION POLICY

AQA

AVIATION RESOURCE MANAGEMENT SURVEY TEAM

EVALUATIVE  
ARMS REPORT

RELEASED IN PART  
B4

OF THE

United States Department of State  
Bureau for International Narcotics and Law  
Aviation Division

CONDUCTED  
August 24 through September 2, 1998

DATED  
September 3, 1998

PREPARED BY:

Jack Milavic, ARMS Team Leader

\_\_\_\_\_  
Mike Miles

\_\_\_\_\_  
Randy Stewart

\_\_\_\_\_  
Douglas Frederick

UNITED STATES DEPARTMENT OF STATE  
REVIEW AUTHORITY: HOWARD H LANGE  
DATE/CASE ID: 14 OCT 2008 200103928

UNCLASSIFIED

## UNCLASSIFIED

**II. EXECUTIVE SUMMARY**

The United States Department Of State, Bureau for International Narcotics and Law Enforcement Affairs/Aviation Division, (DoS/AD) provides a service that has an international impact on the reduction of illegal drugs. The success of DoS/AD efforts are quantifiable and affects the amount of illegal drugs that appear on streets in the United States and International Community. DoS/AD employs' civilian contractors to perform the aircraft spray program. The contractor provides aircrew, logistics, and maintenance support for three primary narcotics missions in DoS/AD. These missions include eradication, interdiction, training and other missions assigned by the Embassy. The relationship between DoS/AD and contractors is that of a closely coordinated cohesive team. DoS/AD Aviation is headquartered in Melbourne, Florida. The ARMS team found that DoS/AD personnel and contractors are enthusiastic and dedicated about their operation and excel in their respective fields of expertise. With one exception, the combined efforts of the DoS/AD and Contractors insists that the highest level of standardization and safety be practiced at all times. The exception to this practice is occasionally dictated by the Embassy and beyond the control of DoS/AD. It appears at times, the motivation of the Embassy is not in concert with those individuals performing the actual mission experiencing overt hostile action directed at them. The following is a general summary of the areas that the ARMS team evaluated pertaining to the mission of the United States Department Of State.

**A. MANAGEMENT AND ADMINISTRATION:**

There is a significant lack of automation in DoS/AD to facilitate expeditious and accurate exchange of information between all satellites and parties in decision making processes. Although there is some computer programs in place they are inadequate and cannot be easily modified at nominal costs. Existing systems do not interface with maintenance, operations, training, scheduling, logistics and budget effectively. The absence of a user friendly automation system results in non-cost effective operations. Some positions in management and staff are under graded and might be inefficiently aligned. There are also positions located in Melbourne that are not accountable to the management on site.

**B. TRAINING:**

The standardization of training for fixed and rotary wing pilots is comprehensively administered and documented. There is complete uniformity of concept, application, and record keeping for both fixed and rotary wing programs. The only exception to this excellent level of standardization is the policy of allowing minimally to non trained Colombian National Police pilots to function as co-pilots on the CASA-212.

UNCLASSIFIED

**Annex 48**

**MEMORANDUM FROM PETER P. TRENT, INL/RM/ASD, PSC  
BOGOTA, TO GRANT HARDEN, INL/RM/ASD, COR,  
DOCUMENT G 16, 4 JULY 1996**

*(United States Embassy in Bogotá, 2011)*



UNCLASSIFIED

RELEASED IN PART  
B4, B6

TO: Grant Harden, INL/RM/ASD, COR

FROM: Peter P. Trent, INL/RM/ASD, PSC Bogota

SUBJECT: Monthly Evaluation - JUNE 1996

MANAGEMENT

The overall rating for June 1996 is Excellent.

Business Management

This area is graded Excellent. Contractor responded to, and resolved, a number of high visibility problems that were beyond his control or ability to forecast. Repositioning of maintenance equipment to handle heavy maintenance requirements, maintenance personnel realignment, and active interaction with host nation customs personnel all combined to turn a problem beset month of operations into a reasonably successful effort. Improvements in methods of operation and administration were undertaken to increase efficiency and daily operations and to improve performance standards. Detailed in the remainder of this monthly evaluation, these efforts demonstrate the contractor's desire to preempt problems and achieve high quality standards. This month's supply difficulties with engine serial numbers, lost oil coolers, and poor pre-shipment inspections of items sent down range, made life for the Colombian operation more difficult than it had to be. Manning shortfalls in maintenance and operations showed significant improvement at month's end and will do much in the way of insuring accomplishment of program objectives.

Contract Management

This area is rated Excellent. The critical review of methods of operation and program requirements netted gains in several areas. Renewed focus in the areas of manpower utilization and equipment needs and availability have brought local operations to a higher level of contract management. This management has taken the form of not simply insuring contract standards are maintained, but that they are maximized. The requests for additional personnel, test equipment, and aircraft equipment upgrades were all geared to ensuring the government receives the capabilities it expects. These types of initiatives are just as valid as indicators of contract management, as they are of business management. Cost control and resource monitoring remain excellent, and calls for expenditures to increase capability are in line with value for the dollar thinking. Examples of this are the request for analog data modification to PR-1000. This is a contractor initiative and is an attempt to provide a means of early detection of engine abuse and the preempting of expensive overhaul requirements, spend a little and save a lot approach.

|           | Action        | Info |
|-----------|---------------|------|
| CC        |               | ✓    |
| CCS       |               |      |
| COR       |               |      |
| DO        | JULY 04, 1996 | CHG  |
| OAA       |               |      |
| SP        |               |      |
| SE        | ✓ SA          |      |
| LG        | ✓ L           |      |
| MX        | ✓ M           |      |
| QC        | ✓ QA          |      |
| PC        |               |      |
| OPR       | PRM           |      |
| CA        | ✓             | MM   |
| Read File |               |      |
| Read File |               |      |

(Send to  
Action  
addressees  
first)

G 16

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Schedule

Scheduling is graded Outstanding. The scheduling of aircraft this month was extremely challenging and the contractor maximized the resources at his disposal. The return of the C-208 and windfall of additional support aircraft flying time was fully exploited. Judicious use of the airframe allowed full support of the PR-1000 repair, engine change requirement on T-02 and the intensified San Jose FOL effort. Battle damage repairs and resulting T-65 shortfalls were handled as effectively as possible given the shared scheduling authority of the T-65 aircraft.

## TECHNICAL

Operations

This area was graded Excellent. There still are no standard operating procedures published for the Colombian operation. This is offset, to a high degree, by the fact that the level of effort required to ensure host nation procedures remain within acceptable limits has been enormous. Active participation by operations personnel in assisting and guiding host nation personnel in operational planning and procedures was indispensable and the PSC's number one priority. The contractor responded very well to the challenge.

1. Operation Planning: This area was the focus of attention this month. The development of operational plans and standards has become a critical area of concern for the program. The employment of INL aircraft, once students have been qualified, is a central issue in the overall success of the program. The push by the CNP to increase the overall effectiveness of the counter narcotics effort has resulted in their call to evolve or improve employment tactics and expand operations. These new concepts of operation have in some cases caused serious difficulties because the concepts have not fully addressed T-65 operational capabilities and limitations. Operations personnel have responded to these new CNP initiatives by producing upgraded briefing guides, operational plans and methods of operation. Rules of engagement that detail operational standards have served to define operational limits and give both the CNP and NAS personnel a common, and firm, guide from which to work.

2. Operational Readiness: Excellent. Aircraft are in flyable condition and available if it is physically possible to do so. Battle damage or lack of parts are the only things that prevent an aircraft from being mission ready. Oversights and lack of effort do not exist in this team.

3. Training: Training operations continued to grow this month despite the lack of new students. The expansion of operations, detailed in the Operation Planning paragraph, has brought with it associated problems in Colombian contract pilot capability. The

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need to provide continuation training in several areas and the need to develop new "special mission" and tactical training programs has kept instructor personnel busy. Expanded follow-on navigation training was instituted to insure pilots could execute the more complex flight plans associated with straight line spray operations. Observer training requirements, Pathlink data reduction and enhanced reconnaissance procedures training programs are all currently in work to bring the Colombian force to a level of capability equal to the task at hand.

4. Standardization: This area also improved this month. Production of a Colombian "Pilot Information File", formalized operational debriefing guides and revised daily reporting formats are part of the continuing effort to improve overall standardization. Although the internal standardization program is lacking in certain areas, the efforts to improve the CNP operation with standardized operating procedures and safety guidelines, to ensure INL aircraft are operated with oversight and safety, are noteworthy. As CNP standardization and procedures are more of a concern to the PSC, the concentration on this problem is at my insistence. Some of the delay in correcting standardization problems can also be attributed to the anticipation of the revised standardization guidelines being published by INL.

5. Pre-Accident Plan: Pre-mishap plan in place and functional. Personnel use it effectively on an all to frequent basis. Enough said.

### Maintenance

Maintenance operations were rated Excellent. The mission capable rate of 86% does not accurately reflect the work and effort that went into achieving it.

1. Not Mission Capable Maintenance (NMCM): 6% Outstanding.
2. Operational Readiness (OR) Rate: 86%, Excellent. The 42% FMC and 44% PMC rates are excellent when factoring in the supply difficulties and manning shortfalls. Partial loss of support aircraft was also a negative impact.
3. Production Control: Outstanding. Maintenance personnel continued to deliver quality maintenance products under demanding situations. Two significant hostile fire repair operations were completed this month, with a stringer repair on T-13 and the sheet metal repair on 8 bullet holes on T-09. Additionally, maintenance personnel have gone above and beyond in their support of the San Jose operation. Flight operations there began at 05:30 in the morning, with the launch of the first weather reconnaissance flight, and normally ended at 16:00 with the landing of continuation training missions. Post flight inspections, shock absorber replacement, hopper reseals were all performed long after the normal work day ended. It was with rare

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exception that an aircraft was not available for operations and training. Maintenance technician, [redacted] deserves special recognition for his commitment to delivering a first rate product on demand. Innovations such as, temporarily adapting the fuel pump off of T-06 to defuel T-11, because local defueling equipment was not available, further illustrate the desire to find solutions to problems.

B4, B6

**Quality Control:** This area was rated as Excellent.

1. **Quality Control Plan:** Plan is reviewed and procedures followed. Monitoring, evaluation, and control of parts removed from T-06 has been excellent. Approval of use of these parts is obtained, and documented, from the INL PSC prior to installation. Wing repair on T-13 was done only after the repair procedure was fully discussed and clearance to proceed given.

2. **Continual Evaluation of Maintenance Practices:** Operations at San Jose and concern for aircraft safety/security were enhanced when maintenance personnel instituted the policy of dispersing the aircraft as widely as possible on the ramp space available. This small detail demonstrates the attention to detail and desire to improve daily operations and program effective the maintenance personnel have. ISU-60's were also repositioned to improve maintenance accessibility and help keep equipment cleaner. Here again the scrounging, of a hard to obtain forklift, to move the ISU's was self initiated and a response to a maintenance condition that was not optimum.

3. **Accuracy of Maintenance Records:** The accuracy of maintenance records always receives special attention. Difficulties arising from inadequate communications and dispersed operating locations make review of maintenance data record inputs by maintenance lead technician and maintenance manager a standard operating procedure. This double checking of records provides exceptional accuracy. Questioning of status issues has also contributed to the excellent condition of the maintenance records.

4. **Subcontractor/DOD Maintenance:** Supervision of both Global and Cobro performance continues to be excellent. Performance and requirements are monitored closely and the prime contractor assists the subs with requests and unusual problems. Excellent working relationships.

**Material Support:** Material Support was Excellent. Logistics personnel continue to put forth maximum effort in supporting the program. The review of the current T-65 PLL, to determine if it still reflects and fits current mission demands, is a prime example of insuring problems do not exist. The accurate assessment of requirements was undertaken to establish if the problems of shipping/customs times and money could be eased by the redefining the PLL and its' stock levels. The assistance of the logistics chief was also pivotal in the installation of the telephones at San Jose. The telephone installation had been the

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responsibility of the CNP who had failed to make any progress, despite constant prodding from the NAS and the PSC. His direct contact with the San Jose telephone company, and clarification of requirements, resulted in the solution of a problem that had continued for seven weeks.

1. Not Mission Capable Supply (NMCS): 08%. Outstanding
2. Inventory Accuracy: Inventory accuracy remains high. Parts recovered from T-06 are being cataloged as they are removed and returned to main base. Parts location and availability are accurate and have been at the quantity indicated during spot checks.
3. Material Accountability: Control of government property disposition continues to be excellent. Repositioning of equipment is always noted whether it be ISU-60's to Valledupar or the transfer of a engine hoist to the FOL at Neiva.
4. Material Management: Material management and tracking are excellent. My no notice requests for shipping status and disposition are always answered quickly and accurately. Location of a shipment, it's Customs status, and it's anticipated release are readily available. Follow up action on shipments whose status's are in question is vigorous and persistent. Operations without the C-208 this month required above and beyond effort by logistics personnel to find alternative and timely shipping methods for moving vital parts to the FOL's.

## SAFETY

This area is rated excellent.

1. Flight Safety Program: Flight safety is receiving emphasis. Instructor pilots continue to deliver the message on the need for flight safety and standardization to the Colombian contract pilots. Flight safety issues have been brought to the attention of the PSC and corrective actions initiated. Flight gear requirements for observers, survival equipment training classes, and rescue hoist training have all added to the overall safety of the mission. The absence of the flight safety officer, although not ideal, was compensated for by the active involvement of the remaining pilots.
2. Ground Safety: The Ground Safety Program receives excellent attention. Personnel are observant and point out deficiencies. The need for improved fire fighting capability was pointed out by one of the instructor pilots during his stay at San Jose. His recommendation that at least one 50/100 lb. fire bottle be located at each FOL was right on. CNP fire fighting equipment is woefully inadequate and could not respond to a ground fire on one of our aircraft. Four fire extinguisher will be ordered to counter this serious problem. Technical Advisors [redacted] [redacted] picked up shovels and put safety into action by making

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taxiway repairs to the ramp entrance. DC-3 use of the dirt entrance way, to the concrete ramp, had caused deep holes in the rain soaked earth. This constituted a real hazard to all taxing aircraft, including the T-65's, who were using excessive power to cross the area. Well done by both individuals

3. Safety Inspections and Surveys: Safety inspection was conducted this month in conjunction with the safety stand down at San Jose. Ground hazards/deficiencies in the form of aircraft ramp tie downs and grounding points were identified. Colombian mechanics were again briefed on the proper method of ground handling the T-6, for both their safety and the safety of the aircraft.

4. Incident/Accident Reporting Accident reporting continues to be timely and accurate. Although no ground or flight safety incidents were reported, the forwarding of hostile fire incidents provided sufficient evidence of the contractor's excellent compliance with this contract requirement.

5. Environmental Protection Plan: Hazardous waste and chemical handling and disposal are receiving attention. No unsafe handling of hazardous material was observed and efforts to correct Colombian deficiencies were noted. A leaky mixing unit was noted during filling operations. After the filling was completed, U.S. personnel moved to repair the leaking system and reconfigure connections to avoid a recurrence.

6. Drug Testing: One new hire COBRO employee tested. Not otherwise observed.

**COST**

Cost control efforts are excellent. Spending is monitored by maintenance manager for excesses and necessity. Checks and balances on spending, authorizations and levels of expenditures are in place and used. Clarifications of appropriateness are asked for from Patrick if any doubt exists locally. Meant as a serious compliment, personnel act like they're spending their own money, this attitude is reassuring.

**SUMMARY**

Although the operational pace set last month was not continued this month, it was still extremely busy. Hostile fire incidents, Customs difficulties, engine difficulties and two phase inspections all combined to keep maintenance personnel working hard. Operational mission, training and reconnaissance flight schedules were often run back to back, creating difficult maintenance scheduling problems and long days. On the operations side of the house, change proposals to operational tactics, ground verification missions, continuation training and the implementation of new operational guidelines and requirements kept everyone actively engaged. Interaction with the CNP and NAS

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was constant and for the most part productive. Contractor morale and attitude remained high during some very trying situations. Overall the contractor registered progress in improving the program and furthering mission objectives. In those areas where success was not achieved it was not due to a lack of trying.



PETER P. TRENT, INL/RM/ASD, PSC  
NAS Bogota

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**Annex 49**

**MEMORANDUM FROM INL/AD SAFETY – GEORGE C. ARZENTE TO INL/AD  
OPERATIONS – PAUL O’SULLIVAN ON AWARD FEE INPUT, DOCUMENT J-24,  
16 JUNE 1998**

*(United States Embassy in Bogotá, 2011)*





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J24

16 June 98

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MEMORANDUM

RELEASED IN FULL

To: INL/AD Operations – Paul O’Sullivan

FROM: INL/AD Safety – George C. Arzente

SUBJECT: Award Fee Input, May 1999

**FLIGHT SAFETY /GROUND SAFETY PROGRAM: Outstanding.** During May 1999, the contractor safety staff at PSD planned and accomplished the following:

General safety, ground safety and aviator safety training subject matter was distributed in both English and Spanish to operating sites in Colombia, Peru, and Bolivia.

16 newly hired pilots attended safety orientation and ALSE inprocessing conducted by the contractor safety manager and ALSE shop technician.

Coordination was made with safety representatives in Colombia for a mandated “Safety Standown Day”. A “Who will have the next accident” survey was completed by contractor employees and a summary was written. The summary was sent to PSD and will be discussed at the next PSD Quarterly Aviation Safety Committee. The safety manager in Colombia has started addressing safety issues that surfaced from that survey.

A monthly general safety newsletter was published and distributed to operational locations in Colombia, Bolivia, and Peru.

A general safety inspection of hangars 985 and 986 was conducted on 14 May 99 with no major discrepancies noted.

Weekly hangar floor safety training (hip pocket training) was conducted on each Friday in May. Subject matter topics varied from aircraft jacking procedures to aircraft towing procedures.

Initial Hazard Communications Training for 8 new employees.

On 14 May 98, in Colombia, an OV-10D had a gear-up controlled impact with the ground after take off. The cause of the mishap has been investigated and the appropriate countermeasures have been implemented. One area of concern, which surfaced as a result of this mishap, was the new Tri-Max fire extinguishing system which was not in service due to problems with system charging and missing operating instructions. These problems have also been resolved.

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**Annex 50**

**MEMORANDUM FROM INL/C/ASD - DAVID JOHNSON TO INL/C/ASD -  
GRANT HARDEN ON SAFETY AWARD FEE EVALUATION FOR OCTOBER 1996,  
DOCUMENT G 50, 14 NOVEMBER 1996**

*(United States Embassy in Bogotá, 2011)*



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MEMORANDUM

November 14, 1996

TO: INL / C / ASD - Grant Harden

FROM: INL / C / ASD - David Johnson

SUBJECT: Safety Award Fee Evaluation for October 1996

G 50

**The overall rating for this period is excellent.****a. 4.3.1 Safety personnel rating is excellent.**

- The PSD Safety Manager and Safety Specialist are highly qualified and proactive in their duties.
- All sights have trained and qualified safety representatives.

**b. 4.3.2 The Flight Safety Program is rated low acceptable.**

- The monthly aviation safety topic "Hazard of Hedge Hopping" was trained at all sights and provided in both English and Spanish.

Safety could be improved with the OV-10 pilots. An incident occurred that revealed pilots lack of experience in the OV-10 and discipline in following published checklist procedures were at fault. This incident resulted in a precautionary landing but results could have been catastrophic. Pilot's management also did not adequately deal with the pilots lack of discipline. Corrective actions did not deal with individual system inadequacies.

**c. 4.3.3 Ground Safety Program is rated excellent.**

- Weekly safety topics were trained at all sights and provided in both English and Spanish.

**d. 4.3.4 Safety Inspections/Surveys are rated excellent.**

- PSD Safety Specialist conducted safety inspections of the hangar, block house, and logistics warehouse with no major shortcomings being identified.
- Safety surveys were completed at all down range sights.

**e. 4.3.5 Incident/Accident Reporting is rated excellent.**

- All reports have been submitted in accordance with DoS / ASD directives.
- The PSD Safety Manager reviews all incident reports to search for trends.
- The PSD Safety Manager is currently using the automated incident reporting system and maintaining all related data tables.

UNITED STATES DEPARTMENT OF STATE  
REVIEW AUTHORITY: CLARKE N ELLIS  
DATE/CASE ID: 13 FEB 2009 200103928

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***f. 4.3.6 The Safety Plan is rated excellent.***

- Rehearsals of the pre-mishap plan has been completed at each site to ensure that the plan is effective.
- Updates are currently under review for the addition of the OV-10
- The PSD Safety Manager has reviewed the safety plan for continuity and effectiveness.
- An SOP is being developed for hot refuel operations in Colombia.

***g. 4.3.7 The Environmental Protection Program is rated outstanding.***

- Initial HAZCOM training was completed for 1 employee(s).
- Paint usage logs for this period were submitted on time as directed.
- The Colombian hazardous material list was transitioned to a database and MSDS format.

During this period, the PSD Safety and Environmental Manager and Specialist have aggressively pursued operations related to environmental protection. Of special note was the research conducted regarding OV-10 paint removal. Environmental and safety hazards were identified early in the OV-10 project to ensure time was available to acquire required equipment and permits.

***h. 4.3.8 The Drug Testing Program is rated excellent.***

- Three tests were completed on new hires with zero positive result(s).
- Eleven random tests were completed with zero positive result(s).

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**Annex 51**

**UNITED STATES EMBASSY IN BOGOTÁ, CERTIFICATION WITH REGARD TO NIGHT  
SPRAYING TESTS AND ERRONEOUS TIME DATA FROM DEL NORTE, FROM THE  
NAS DIRECTOR, JAMES B. STORY, TO THE COLOMBIAN MINISTRY OF FOREIGN  
AFFAIRS, 27 SEPTEMBER 2011**

*(United States Embassy in Bogotá, 2011)*





[Seal]

Embassy of the United States of America

Bogotá, D.C.

27 September, 2011

Ambassador

Sonia Pereira

Coordinator Affairs before the International Court of Justice

Ministry of Foreign Affairs

San Carlos Palace

Bogotá, D.C.

Your Excellency:

We are pleased to greet you and wish you success at your work.

The Government of the United States with the cooperation of the Colombian National Police carried out night spraying tests from February to April 2000 and in January 2002. Once these tests were completed, it was concluded that night operations would not be carried out.

Since the dates mentioned above, the Government of the United States has not carried out night spraying operations. I am enclosing the map that shows the areas sprayed at night during the aforementioned period of time; none of such areas is within the 10 km of the border with the neighboring country, Ecuador

There are spray data submitted to Ecuador from Del Norte system which may indicate night spraying operations after those dates. The information contained in Del Norte data system is erroneous because the internal clock of the aircraft used for spraying was never synchronized correctly.

The Government of the United States uses an additional form called Daily Flight Summary, which shows the exact take-off and landing time for all aircraft involved in aerial eradication missions. These forms have been shown to the Government of Colombia previously and can be checked with for verification of information. We especially appreciate to take into account the data contained in these forms instead of the ones in Del Norte system, since the information contained in them corresponds to the actual situation.

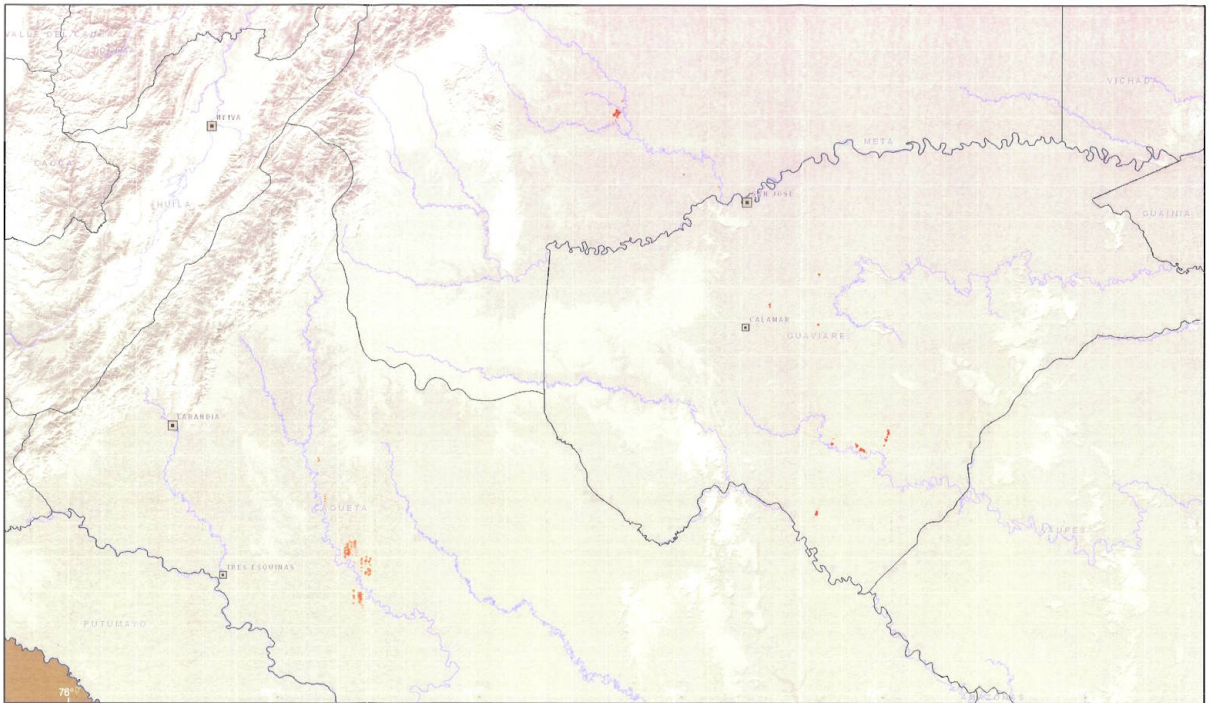
Please accept our most sincere apologies for the confusion that this error may have caused in the analysis of this case and we hope that this letter clarifies the discrepancies.




We avail of this opportunity to renew to you our high consideration and respect.

Sincerely,

[Signed]

James B. Story  
Director  
Narcotics Affairs Section - NAS



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MAP RFD FIELD 03/08/11  
GJOINT PSD // BPW 

**Annex 52**

**DEPARTMENT OF STATE SAMPLE CONTRACTOR EVALUATIONS,  
DOCUMENTS G 93, L 16, L 26, L 34 AND L 41**

*(United States Embassy in Bogotá, 2011)*



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**TECHNICAL****OPERATIONS**OPERATIONS PLANNING

G93

Operations planning was excellent. In Colombia, operational mission planning continued to be outstanding. The site also dealt with unprogrammed requirements in excellent fashion. In addition, risk management was enhanced considerably by the contractor during the month, adding to overall mission safety. Host nation coordination was also accomplished in an excellent manner this month due largely to the efforts of the Operations Manager in Bogota and the Operations Coordinators at the FoLs.

In Peru, the OPSCOs continued to provide operational advice and council to the PNP leadership. The site additionally advised the PNP on planned deployments to a variety of locations to support simultaneous eradication and enforcement activities.

In Bolivia, the Contractor is not normally responsible for operational planning and execution, except in the case of the CASA 212 crew. Their performance has been outstanding as evidenced by the favorable comments written in the NAS Trinidad regional director's monthly report.

OPERATIONAL READINESS

Operational readiness is rated excellent this month, with improvements in overall mission execution. Better fumigation discipline was noted among fixed wing spray pilots. In addition, the Contractor's performance in meeting mission requirements was noteworthy.

In Bolivia, the Contractor's CASA 212 crew is remained fully mission qualified an responsive to ongoing mission requirements. In addition, the Contractor has certified two RDTF pilots as additional ,operational crewmembers. In both Peru and Bolivia, the availability of qualified contractor personnel and equipment support necessary to meet operational requirements was superior.

TRAINING

Training is rated excellent. In Colombia, formal training for new pilots was conducted in a very responsive manner, and informal training of host national T-65 mechanics continued unabated.

In Bolivia and Peru, training programs continued to meet or exceed contractual requirements.

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### STANDARDIZATION

Standardization is rated excellent. In Colombia, outstanding emphasis was placed on the no-notice check rides for the pilots of both fixed wing and rotary wing aircraft this month. Top notch performance by the stan eval pilots for fixed and rotary wing was also noted this month. In addition, records management continued to be excellent.

In Bolivia, the Contractor is doing an excellent job in this area, providing guidance and technical assistance to the RDTF through the Pasas.

In Peru, efforts to improve the administration of the standardization program continued, despite the frequent deployment of the OPSCOs to the field.

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B4, B6

L16

Operational Planning:

Rating: Outstanding

Operational planning this month at PSD focused on supporting the eradication campaign in the Putumayo, UH-1N acceptance test flights for 15 N models destined for Colombia, some aircraft movements to and from Colombia, and planning for removing C-4 out of AMARC and ferrying it to PSD. All planning for these events was outstanding. The detailed planning and concept of operations developed for the Putumayo operation was implemented in Colombia with outstanding results. In addition, PSD Operations was key in the preparation for the visit by Ambassador Mack, the DAS for INL and head of the Plan Colombia Team for INL.

Operational Effectiveness:

Rating: Outstanding (high; both spray and COLAR kicked ass in the Putumayo)

The major push into the Putumayo—an event Air Wing has waited over two years for and a major component of Plan Colombia, a push of interest at National level—was executed extremely well by the Colombia site and supported very well by the PSD staff. Recognizing the short window of opportunity available during the dry season to conduct this operation and realizing that the GOC could stop it at any moment due to political concerns in country, the contractor took very appropriate measures to mass needed resources and conduct a surge operation against the illicit crop in the Putumayo; the densest cultivation of coca in the world. The Deputy Program Manager, [redacted] was sent to the site to fill in as Site Manager and to supervise the surge. He did an outstanding job energizing the site, lining up the resources, and sustaining a maximum effort by the whole team. All available OV-10's were forward deployed, and all available mechanics and pilots from PSD were deployed in support of this operation. Daily flights of five OV-10's conducting spray eradication were the norm. It was an outstanding surge operation, and was extremely effective. In a 30-day period, the operation sprayed the same amount as in a four-month period in the two previous years. B4, B6

While flying operations over the Putumayo INL/A noted there is still tactical communications problems between aircraft and the FOL. On the positive side, the initiative to use MRSAT phones is excellent and works well. It was successfully used to pass timely, real time, and much needed tactical information from remote sites such as Villa Garzon and Orito back to Larandia and even PSD. Kudos for this initiative. On the negative side, it was noted that on at least one mission over the Putumayo not one helicopter in the entire package had HF communications back to Larandia. On this mission a Cuervo was in fact hit, and an OV-10 had to remain on site to act as a radio relay because the helos were unable to pass information to Larandia themselves. This is unsatisfactory and has been an Air Win concern as expressed in TD 52, April, April 28, 2000, and TD 90, 31 August 2000.

A short 3-minute video of spray operations conducted by five OV-10's was given to the Assistant Secretary of INL, who was pleased with it and noted he could use it to show other agencies just how selective and controlled the spraying is. The two-man SAR Team of [redacted] [redacted] made the video on very short notice and with little guidance and should be recognized for the fine job doing it.

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At PSD, the N model test flight program completed flights on all 15 refurbished N models in preparation for shipment to Colombia. This was done on time, as planned.

In addition, the fourth C-27 was brought on line and ferried from AMARC to PSD as planned.

The COLAR N Model conducted numerous air assault operations in the Putumayo in support of the spray program and was engaged in combat on several occasions. They performed in a superb manner, and were key in inserting and moving the troops in support of the spray program. They flew a very heavy flying hour program, and the entire AirWing/COLAR Team did an outstanding job sustaining the pace. The maintenance crew, even though slightly undermanned, was able to sustain the pace and support all operations. The Air Wing COLAR Operations personnel did an excellent job in controlling operations in spite of poor planning and limited Intel support by and from the COLAR ground units. The magnitude of this achievement; i.e., going from literally scratch to flying combat assaults in a heavily FARC area, is extremely impressive.

PSD Operations provided outstanding support for the visit by Ambassador Mack. [redacted] [redacted] as always, was outstanding in arranging the conference room and running the computer for the briefing.

B4, B6

### Training and Institution Building

Rating: Excellent

#### Training Programs:

Rating: Excellent

A personal observation from a 10-day trip to Colombia in January is that the COLAR program is exceptional; professional and disciplined. The DynCorp team on this program has in a very short time created a COLAR aviation unit from scratch that operates at a much higher standard than all existing COLAR aviation units—it is literally a model for COLAR aviation. As noted in the past two months Julian Medina should be specifically recognized for his outstanding work as the Operations Manager and key trainer; an absolutely outstanding performance. The COLAR Program has selected and evaluated its fifth COLAR PIC and is doing an excellent job in producing them. This is a key element in institutionalizing the COLAR program and the DynCorp COLAR Operations Manager and IP's are doing an excellent job with it. Emphasis needs to be put on the COLAR Basic Mechanics Course scheduled to start 19 February 2000. Hands-on training aids required for students were not procured prior to the training team's departure and had not been resolved as of this rating period. Additional emphasis needs to be put on developing COLAR armament technician capability to achieve nationalization goals.

#### Standardization:

Rating: Excellent

Performance of both COLAR and eradication pilots on recent visits by DoS operations personnel indicate a strong Standardization program in Colombia. Twelve APART evaluations, 6 no-notice evaluations and 5 night vision evaluations were conducted during this period. The COLAR program completed 7 initial N-model aircraft qualifications. PSD F/W standardization

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pilots flew a complete rotation with the eradication pilots checking training and standardization. The contractor instructor pilots in Bolivia prepared a mountain training package for the upcoming Yungas eradication effort for both F/W and R/W aircraft. Peru completed IP training in helicopter float operations and forwarded recommended changes to the float training program.

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B4, B6

16 May 2001

L26

Unclassified  
MEMORANDUM

To: INL/OA Operations – Paul O’Sullivan

FROM: INL/OA Safety – George C. Arzente III

SUBJECT: Award Fee Input, April 2001

Flight Safety PersonnelRating: **EXCELLENT**

The contractor safety staff identified and corrected deficiencies through site visits and evaluations at PSD and Colombia’s operational locations. [redacted] PSD Safety Manager, conducted flight, ground and hazardous material inspections during his orientation trip to Colombia. While in Colombia, he also attended the site Managers briefing on 11 April and presented the GAU-17 Findings and Recommendations and discussed the strategic plan for Safety. The new Bogota Safety Manager, [redacted] arrived for duty 25 April. The monthly safety newsletter, which initiated a program-wide writing contest, was published and sent to all departments and site locations. Reporting of required monthly safety meetings and inspections was re-emphasized at all downrange locations via the site managers and safety personnel. PSD safety staff in-processed 19 new hires during the month.

B4, B6

Flight SafetyRating: **EXCELLENT**

Monthly aviation safety meetings for all pilots are being conducted at all locations. The subject addressed during the PSD monthly aviation safety meeting was *Hurricane Evacuation*. Eight new aviators were in-processed at PSD by the safety staff. The monthly flight safety topic forwarded to the sites was *A Flyer’s Code of Conduct*. The Safety Department assisted Dos in developing a SOP for a Peruvian shoot-down Incident.

Ground SafetyRating: **EXCELLENT**

Weekly safety meetings were conducted at all locations. The topics of the meetings included: *Set Your Sights on Safety, Power Tools, Confined Spaces, and Cellular Phones*. Identified a relocation area for age equipment and obtained Age Maintenance Procedures from the 920<sup>th</sup>. The ground Safety Specialist began updating and compiling revised MSDS’s for incorporation into the MSDS database.

Safety Inspections/SurveysRating: **EXCELLENT**

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PSD reviewed the ARMS checklist in preparation of the ARMS inspection. PSD eye wash stations, fire extinguishers and facilities were also inspected. . Monthly and Quarterly Safety Inspection Checklists were sent to all site Managers and Safety Representatives. PSD Safety also developed a Self-Inspection Checklist, which was sent to all downrange sites.

Incident/Accident Reporting

Rating: **EXCELLENT**

All incidents and accidents were reported and investigated in a timely manner. Reports were reviewed by PSD safety staff and forwarded to DoS Safety. [redacted] Flight Safety Specialist, was on-site in Colombia to conduct an investigation of both the mini-gun discharge and UH-1N hard landing. [redacted] participated in the DoS convened investigation board for the UH-1N hard landing, EJC 212, in Santa Ana. As a result of the fuel cell injury in Larandia, Safety identified and corrected the problem by expedited the support materials to alleviate the hazards.

B4, B6

**SAFETY PLAN:** The Safety Plan was reviewed and approved by DoS on 30 April 2001.

**PRE-ACCIDENT PLAN:** All downrange locations were asked to update their pre-accident plans and to include current rosters for all employees.

**ENVIRONMENTAL PROTECTION PLAN:** A Hazardous Waste Shipment was conducted on 26 April. The Environmental Specialist addressed and resolved numerous Hazardous Material Transport issues for Peru.

**DRUG TESTING:** During the month of April, 32 new employees were drug tested. Random testing was completed for 2 people.

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6 July 2001

L34

MEMORANDUM

To: INL/OA Operations – Paul O’Sullivan

FROM: INL/OA Safety – George C. Arzente III

SUBJECT: Award Fee Input, June 2001

Flight Safety Personnel

Rating: EXCELLENT

The contractor safety staff identified and corrected numerous deficiencies through site surveys and spot inspections at PSD. The monthly safety newsletter, re-emphasized a program-wide writing contest, and was sent to all departments and site locations. PSD safety staff in-processed 21 new hires during the month.

Flight Safety

Rating: EXCELLENT

Monthly aviation safety meetings for all pilots are being conducted at all locations. The PSD monthly aviation safety meeting addressed local weather anomalies. The second quarter Aviation Safety Committee Meeting was held on 20 June. Most old business issues were resolved except the Ordnance Facility license, and the water survival training coordination with Jacksonville Naval Air Station. Six new aviators were in-processed at PSD by the safety staff. The monthly flight safety topic, "The Aviator Personality" was forwarded to the sites. Safety provided inputs for the GAU 17 Conference.

Ground Safety

Rating: EXCELLENT

Weekly safety meetings were conducted at all locations. The topics of the meetings included: "Feeling Hot! Hot! Hot!" - "First Aid" - "Off-the-Job Safety" - "Now Hear This!" and "OSHA Top 10 in 2000". The second quarter Ground Safety Committee meeting was held on 27 June. All old business items were resolved and the committee reviewed and revised its bylaws. The Safety Office conducted the first ever Supervisor Safety and Risk Management Training. All PSD Safety received Air Force level certificates for Risk Management Training, 26-27 July. In the weekly floor meeting and at the Managers meeting, the Safety Department re-emphasized the smoking policy and designated areas.

UNCLASSIFIED

## UNCLASSIFIED

Safety Inspections/SurveysRating: **EXCELLENT**

PSD resolved numerous Aviation Resource Management Survey (ARMS) issues with downrange sites. Resolved all open items on ALSE audit, May 2001. PSD inspected eyewash stations, fire extinguishers, and first-aid kits. A no-notice inspection of the sheet metal shop was conducted on 11 June 2001. Consolidated a list of all Safety Requirements for downrange safety representatives. Conducted site audits of buildings 330, 331 and South Patrick.

Incident/Accident ReportingRating: **HIGH SATISFACTORY**

Most incidents and accidents were reported and investigated in a timely manner. New Safety CIR format is being used downrange with favorable comments.

Safety PlanRating: **EXCELLENT**

The Safety department conducted a Conference with DoS and the Colombian Safety Manager on 13-14 June. The group provided inputs for revisions to the new Safety Directives and Guidelines, Accident Reporting Procedures, Safety SOPs and the Standardized Checklists.

Pre-Accident PlanRating: **EXCELLENT**

All downrange locations have updated their pre-accident plan rosters. PSD rehearsed the pre-mishap plan with a simulated OV-10 cockpit fire on 15 and 18 June.

Environmental Protection PlanRating: **EXCELLENT**

PSD disposed of four drums of hazardous waste. Ten bags of deteriorated fuel foam were packaged and processed through DRMO for incineration.

UNCLASSIFIED

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RELEASED IN PART  
B4, B6

6 September 2001

L41

Unclassified  
MEMORANDUM

To: INL/OA Safety – George C. Arzente III

FROM: DynCorp Safety – [REDACTED]

SUBJECT: Award Fee Input, August 2001

Flight Safety Personnel  
Rating: **EXCELLENT**

B4, B6

The PSD Safety Manager traveled to Colombia to conduct a site audit of Operations. The PSD Safety personnel attended the FAA Accident Investigation Briefing, 6 August 01. The Safety Manager provided a tour of the Department of State facilities to Brigadier General Thomas Taverny, Mobilization Assistant to Space & Missile Center Commander. The monthly newsletter requested a short note from any of our employees on their interesting or unique Safety experiences.

Flight Safety  
Rating: **EXCELLENT**

The Monthly aviation safety meetings for all pilots were conducted at all locations. The PSD Monthly Aviation training covered ICIR reporting. DoS/Safety presented a brief on "It's Not always the Pilots Fault. The office researched the General, Commercial and DOD Engine Failure and Shutdown Rates per 100,000 hours. On 10 August, [REDACTED] participated as a Safety Observer on a local training flight. The Safety Department researched ramp space requirements for the A10. The monthly flight safety topic, Yada, Yada, Yada, was forwarded to all sites.

Ground Safety  
Rating: **EXCELLENT**

Weekly safety meetings were conducted at all locations. The topics of the meetings included: Fall Protection, Confined Spaces—When in doubt, Check it out! Material Handling, and Overhead Powerlines: Look Up before its too Late. The 45<sup>th</sup> Space Wing Facility Safety Inspection outbrief was conducted on 17 August. [REDACTED] attended an OSHA Respirator Program Administrator Course from 27-30 August. While in Colombia, [REDACTED] conducted SMR site training in Larandia and Hazardous Materials training in Bogota. Hazard Communications and Safety Training was provided to 16 new hires.

Safety Inspections/Surveys  
Rating: **EXCELLENT**

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Safety Inspections of South Patrick and Facility 313 were conducted during August. PSD Safety completed it's annual Self-Inspection Checklist on 10 August 01. All monthly fire extinguishers and eye wash stations inspections were completed at PSD.

Incident/Accident Reporting

Rating: **EXCELLENT**

PSD Safety coordinated with DoS on the new definition of mishap categories (i.e. accident/incident). An investigation was conducted on the inadvertent engine shutdown on OV-10 V-5.

Safety Plan

Rating: **EXCELLENT**

As a result of the Hurricane Exercise that was conducted on 20-23 August, the Severe Weather Plan (PSS-2638) was updated to reflect revisions in our Operating Procedures.

Pre-Accident Plan

Rating: **EXCELLENT**

During his site visit to Colombia, [ ] reviewed and provided corrections and recommendations to the Colombian Pre-Mishap Plan.

B4

Environmental Protection Plan

Rating: **EXCELLENT**

Conducted Hazard Site Surveys of Tumaco, Larandia and Bogota. Segregated and packaged hazmat containers for the recycling facility. Coordinated and monitored the sampling of the hangar trench water for environment concerns.

**DRUG TESTING:** During the month of July, 16 new employees were drug tested. Random urinalysis was conducted on 80 employees.

UNCLASSIFIED





**Annex 53**

**MEMORANDA OF JUSTIFICATION BY THE UNITED STATES  
DEPARTMENT OF STATE, 2002-2008**



**Annex 53-A**

**DEPARTMENT OF STATE MEMORANDUM OF JUSTIFICATION CONCERNING  
DETERMINATION ON HEALTH, ENVIRONMENTAL, AND LEGAL ASPECTS  
OF COCA ERADICATION IN COLOMBIA, 2002**

*(U.S. Department of State)*





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## Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia

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The Kenneth M. Ludden Foreign Operations, Export Financing and Related Programs Appropriations Act, 2002 (P.L. 107-115) ("FOAA") lays out conditions under which assistance using funds appropriated under the FOAA may be made available for the purchase of chemicals for the aerial eradication of coca in Colombia. The legislation's requirements and the Administration's summarized responses are below.

### **1. That the coca spraying is being carried out in accordance with regulatory controls required by the Environmental Protection Agency as labeled for use in the United States:**

Tab 2 of the report illustrates that the glyphosate formulation used to spray coca in Colombia is used in accordance with the EPA label instructions for non-agricultural use. In Tab 3 of the report, a letter from EPA Assistant Administrator Johnson EPA confirms that application rates are within the parameters listed on U.S. glyphosate labels.

### **2. That the coca spraying is in accordance with Colombian laws:**

Tab 6 of the report includes a letter from the Ministry of Foreign Affairs of the Government of Colombia confirming that the spraying is being carried out in accordance with each and every applicable Colombian law.

### **3. That the chemicals used in the coca spraying, in the manner in which they are applied, do not pose unreasonable risks or adverse effects to humans or the environment:**

USDA's assessment (Tab 5) opines that the spray program poses no unreasonable health or environmental risks. Upon examining the chemicals that used in Colombia, EPA notes the potential for acute eye toxicity, due to an inert ingredient in the particular glyphosate formulation used by the program. EPA's response points out that the Department did not provide to the EPA the results of INL-commissioned toxicological tests performed on the spray mixture, as promised in a briefing (note: these tests had not been completed at the time EPA submitted its response). EPA replies that because of its inability to review such tests, it is unable to evaluate the toxicity of the spray mixture that we are using in Colombia. In the absence of these testing results, EPA recommended that the Department consider using an alternative glyphosate product with lower potential for acute toxicity.

Until a lower toxicity glyphosate formulation could be made available for use in Colombia, we have continued to spray with the higher toxicity glyphosate product. According to the EPA report, the risks of eye damage from the current formulation are limited principally to the handlers and mixers of the concentrated formulation as opposed to the general public. The concentrated glyphosate formulation is diluted when mixed with water for use in the spray program; approximately 75 percent of the end use product is water. Furthermore, several safeguards are in place to minimize human exposure to the spray mixture. Pilots are carefully selected and trained and are instructed to avoid spraying near people, homes, or occupied buildings. The permissible spray parameters of flight speed, aircraft height, and wind conditions are rigidly monitored and complied with. The Embassy is working with the GOC to warn local citizens in areas where we spray (through radio and newspaper advisory messages) to avoid the spray mist and inform them of precautions to take in case of possible incidental contact with the spray mixture.

The Department now has the results of the eye irritation test of the spray mixture that would have bolstered EPA's analysis, but we did not receive these results in final form until after receipt of EPA's response. This test determined that the spray mixture currently used in Colombia would be rated Category III on EPA's scale of I-IV, with I being the most toxic. Congress is aware that this testing is underway and as we have notified in the addendum to the report, we will provide the testing results as soon as all of the testing is completed.

In addition, INL now has an alternative glyphosate product with lower potential for acute toxicity available for use in Colombia. This formulation, registered in July 2002, is less toxic to the eyes because it uses a different inert ingredient and is also known to have as low or lower toxicity ratings in all other categories, as well. Although this alternative formulation has only recently been approved in Colombia, it has been extensively tested and widely used elsewhere, and is registered for non-agricultural use in the U.S. by the EPA. Because this alternative formulation addresses EPA's recommendation that the Department switch to a less toxic formulation, the Department plans to switch to it for use in Colombia as soon as it can be manufactured, purchased, and delivered. INL expects to place an order for the new product early in September 2002. The Department's notification to Congress will indicate our intention to make this switch, in response to EPA's concerns.

Based on the above information, we do not believe that EPA's reservation about the risk of eye irritation rises to the threshold of "unreasonable risks" or "adverse effects" to humans or the environment identified in the statute.

**4. That procedures are available to evaluate claims of local citizens that their crops were damaged by such aerial coca fumigation, and to provide fair compensation for meritorious claims:**

Tab 7 of the report outlines the procedures to evaluate claims of damage to legal crops from aerial eradication and to provide fair compensation for meritorious claims. This includes an English language version of the Colombian National Drug Council's Resolution 0017, which formalized the new process. Complaints are being received, logged, investigated, verified, and compensation is being allocated to cases with merit. Thus far only two complaints have been deemed valid; compensation in these cases is pending and will be determined through negotiation with the claimant.

**5. That six months after FY 2002 FOIA enactment, funding from this act may not be made available for chemicals for coca eradication unless alternative development programs have been developed, in consultation with communities and local authorities in the departments in which such aerial coca fumigation is planned, and in the departments in which such aerial coca fumigation has been conducted such programs are being implemented:**

Tab 8 of the report illustrates that alternative development programs are being carried out in all but one of the departments where we have sprayed in 2002. In this one department where a small amount of spraying took place in February 2002, an alternative development program agreement has been negotiated and a contract for the work signed. The GOC has agreed that no further spraying will take place in that department until an alternative development program is actually being implemented.

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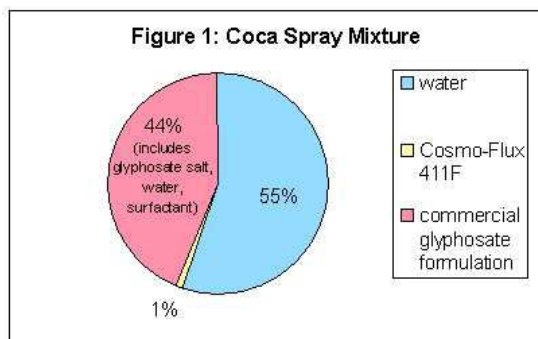


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## Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application

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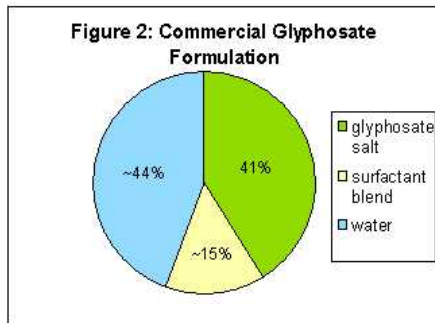
The aerial spray mixture currently used in the U.S.-supported program of aerial eradication of coca in Colombia contains three components: water, an EPA-registered formulation of the herbicide glyphosate, and a surfactant (Cosmo-Flux 411F). These components are mixed together into a spray mixture in the following percentages: 55 percent water, 44 percent glyphosate formulation, and 1 percent Cosmo-Flux 411F (see Figure 1 below). This diluted mixture is applied to coca at the rate of 2.53 gallons per acre. This application rate is within the glyphosate manufacturer's recommendations for both the amount of concentrated formulation per acre and the amount of total spray volume per acre for woody plants and hard-to-control species. Coca is a hardy, woody bush that falls into this category.



### Commercial glyphosate formulation:

The commercial glyphosate formulation used in the spray mixture is registered with the U.S. Environmental Protection Agency (EPA) for sale in the United States for non-agricultural use and contains 41 percent glyphosate salt and 59 percent inert ingredients. Approximately three fourths of the inert ingredient content are water and the remainder is a surfactant blend. A surfactant is essentially a soap that enhances the ability of the herbicide to penetrate the waxy cuticle of the leaf surface. Surfactants are commonly used with herbicide formulations to improve the effectiveness of the product. This commercial glyphosate formulation used against coca is registered, produced, and sold in Colombia, where the State Department's Bureau of International Narcotics and Law Enforcement Affairs (INL) purchases it for the Government of Colombia (GOC) for use in the GOC's spray program. Further information on the chemical composition of this commercial formulation is proprietary and is retained by the manufacturer; it is not publicly available and the manufacturer has not provided it to the Department. Figure 2 is a breakdown of the commercial glyphosate formulation by major components.





#### **Surfactant:**

From the standpoint of coca control, properly selected surfactants make the glyphosate far more effective than if the active ingredient were applied alone. Research by the United States Department of Agriculture's Agricultural Research Service (USDA-ARS) has demonstrated that certain surfactants enhance glyphosate penetration through the waxy cuticle on the coca leaf surface. Appropriate surfactants decrease the surface tension of the adhering spray droplet (causing them to spread further on the leaf surface). Generally, this is good, since the herbicide is less susceptible to runoff loss and greater surface coverage leads to more uptake of the herbicide. The "right" surfactant may form a chemical shield around small clusters (micelles) of the herbicide and enhance their penetration through the cuticle and into the leaf tissue.

In order to function, glyphosate must move from the site of application (the leaf surface) toward the actively growing meristematic tissue - the new shoot tips and the new roots. Here, the herbicide glyphosate finally does its job, blocking an enzyme that is essential for plant growth but absent from humans. Surfactants are a critical component of the herbicide mixture, allowing the glyphosate to reach this actively growing tissue in the coca plant. They may also stabilize the product droplets, reducing water evaporation, and thereby reducing spray drift.

The commercial glyphosate formulation used in the spray program contains 180g/l of surfactant as part of its inert ingredients. As noted above, USDA-ARS research in the greenhouse and in the field (in Colombia, Panama, and Hawaii) showed that commercial glyphosate formulations with surfactants performed better against coca than other glyphosate without surfactants. Nevertheless, when coca ground-truth verification (see "Eradication Oversight" section below) was first done in October 1997, ratings showed mean control of coca within aircraft spray swaths to be about 70%. This was considered unacceptably low, since the goal was to eliminate the illicit crop and force the growers to abandon further coca production. To improve swath control, USDA-ARS scientists recommended two options, not mutually exclusive. One was to increase the level of glyphosate formulation in the spray mixture. The second was to add an additional surfactant to boost control without necessarily requiring a higher dose of herbicide. Previous USDA research had explored possible surfactants, not available in commercial glyphosate formulations, that might enhance phytotoxicity against coca. Several candidates that enhanced herbicide "efficacy" were selected by the GOC for further consideration.

In consultation with the GOC's Environmental Auditor to the spray program, USDA-ARS scientists recommended that any product to be added to the herbicide tank mixture be acquired from a Colombian source, if possible. This would ensure that it was a product already registered by the appropriate GOC regulatory authority, the Colombian Farming and Livestock Institute (Instituto Colombiano Agropecuario, or ICA), and almost certainly already used in Colombian agriculture. Cosmo-Flux 411F was selected as the additional surfactant because it met the above requirements and most closely matched the most effective U.S. products that had been tested by the USDA-ARS in Beltsville and Hawaii as additives to glyphosate for use against coca.

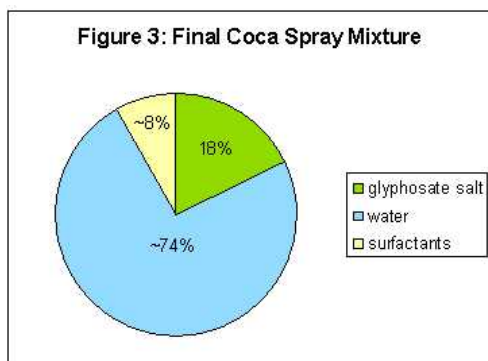
#### **Cosmo-Flux 411F:**

Cosmo-Flux 411F is manufactured in Colombia by a private company. Its use in Colombia is not limited to the GOC's eradication program - Cosmo-Flux 411F is often used as an additive to herbicide sprays for manual and aerial application to crops. Cosmo-Flux 411F is approved for use with herbicides and is registered with the ICA under ICA's lowest toxicological risk category, Category IV "lightly toxic." The Colombian Ministry of Health has also classified Cosmo-Flux 411F as "slightly toxic" (in opinion No. LP-0573/1993). The active components of Cosmo-Flux 411F are polyol fatty acid esters and polyethoxylated derivatives, which are seventeen percent of the product. The remaining 83 percent is made up of inert liquid isoparaffins.

Cosmo-Flux 411F is produced, sold, and purchased for the GOC in Colombia but is not sold in the United States. The EPA Office of Pesticide Programs does not regulate Cosmo-Flux 411F - or other adjuvant products not labeled as pesticides. EPA, however, regulates the use of such adjuvant chemicals if they are purposefully

formulated with and are a part of manufactured pesticide products for use in the U.S. - a common practice. INL asked the EPA's Office of Pesticide Programs to review the complete chemical constituents of Cosmo-Flux 411F to learn what EPA knew about the ingredients so that INL could better assess safety concerns related to the use of this product in the spray program. EPA determined in September 2001 that all of the ingredients of Cosmo-Flux 411F are exempt under 40 CFR 180.1001 from the requirement of tolerances when included in pesticides applied to food, feeds, and livestock. That information reconfirmed the GOC's conclusion that Cosmo-Flux 411F was appropriate for use against coca in Colombia. The Colombian manufacturer of Cosmo-Flux 411F recommends its use in a dose ranging from 0.5 to 1.5 percent. The illicit crop eradication program's use of a spray mixture that is 1 percent Cosmo-Flux 411F is thus within the manufacturer's recommendation.

Figure 3 illustrates the components of the final spray mixture by percentage. Water makes up approximately three quarters of the mixture, a fact that substantially reduces the toxicity of the other ingredients. Glyphosate salt (isopropylamine salt) is the second leading ingredient at 18% of the spray mix. Finally, the surfactants (those within the commercial glyphosate formulation plus Cosmo-Flux 411F) make up approximately 8 percent of the mixture.



#### **Spray mixing and handling:**

The commercial glyphosate formulation, Cosmo-Flux 411F, and water are mixed at forward air bases by mixers/loaders who are members of the Colombian National Police (CNP). The mixers/loaders are trained by the CNP, the U.S. Embassy's spray advisor, and by designated spray pilots. They are trained on the relevant precautions for handling the chemicals in the spray mixture, first aid, and use of personal protective equipment that applicators and other handlers of glyphosate in its concentrated formulation must wear. These include long-sleeved shirts and long pants, waterproof gloves, shoes and socks, and protective eyewear.

#### **Storage and disposal of spray mixture:**

Special care is taken in the management of the commercial glyphosate formulation, which is more concentrated than the spray mixture. Appropriate measures are taken to ensure that glyphosate is not allowed to contaminate water, foodstuffs, or natural areas through its storage or disposal. Storage is in manufacturer-approved plastic barrels in covered areas with good ventilation, away from water sources. At the main spray bases, chemical storage is in a concrete storage shelter approximately 50 centimeters high with a 10-degree incline for the collection of any residues. In addition, sawdust, sand, dirt, clay or other absorbent material is readily available for immediate use in case of glyphosate spills. A drainage system, designed to prevent water contamination via run-off or leaching into the ground, collects water storage, mixing, and loading areas in trenches that carry it to a stabilization pools, which are eventually discharged into a specially selected lot to facilitate natural degradation.

#### **Aircraft and spray equipment:**

Aviators currently spray coca with the single-engine T-65 "Thrush" aircraft built by the Ayers Corporation for agricultural spray operations and with the twin-engine OV-10D "Bronco" aircraft converted from a military observation aircraft to an aerial spray aircraft. INL is currently taking delivery of a third type of spray aircraft, the Air Tractor AT-802, which is a single-engine agricultural spray aircraft similar to the T-65.

The spray nozzles are standard, agricultural nozzles selected and adjusted to minimize the number of small droplets that can drift downwind from a sprayed coca field. These nozzles produce a volume mean diameter (VMD) between 300-1,500 microns. This droplet size was reached after considerable INL and USDA testing and is consistent with the label instructions recommending coarse sprays that are less likely to drift. The aircraft spray systems are electronically calibrated to disperse a specified quantity of gallons of spray mix per hectare, compensating for variances in ground speed. These are calibrated upon installation and are checked each day

during the mechanic's daily inspection and the pilot's preflight inspection. In addition, during actual spray operations the pilot monitors the spray system by observing the readings of the spray pressure and the spray flow rate gauges. Onboard computer and digital global positioning systems (D/GPS)-driven equipment (SATLOC and Del Norte) automatically record each aircraft's actual flight parameters, including differential-GPS track, airspeed, altitude (mean sea level), application rate, and precise geographic location (longitude and latitude coordinates) at the time of aspersions. This allows precise evaluation of each spray event in order to ensure that spraying is conducted within proper target areas and within specified parameters. As part of the end-of-mission check, the mission planner and pilots review the spray logs for any inconsistencies in the recorded spray data.

**Spray pilots:**

Eradication pilots must have approximately 3,000 total flight hours before they are considered for the spray program and can receive preliminary training in illicit crop eradication. Most of these pilots also have at least 1,500 hours of commercial aerial application (crop dusting) experience. The INL Air Wing contractor trains the spray pilots who are Colombians, third-country nationals, and U.S. citizens. Eradication training focuses extensively on the visual identification of coca fields from the air as well as the technical aspects of crop spraying.

**Reconnaissance:**

Detailed aerial reconnaissance of cultivation areas precedes all spray missions. Aerial reconnaissance is performed using a multispectral digital imaging system (MDIS) that identifies crop type through the reflected sunlight in the infrared portion of the electromagnetic spectrum. This airborne camera system is calibrated daily and linked to global positioning systems (GPS) equipment that enables fields to be geo-referenced and accurately plotted onto aviation maps for mission planning purposes. As explained below, this equipment is for mission planning and reconnaissance and is not in any way a substitute for positive visual identification of coca fields by the spray pilot during the actual spray mission.

Most of Colombia's coca crop is cultivated in the lowlands east of the Andes; here, the terrain is generally flat or marked by gentle, rolling hills. The more agile T-65 is used for spraying in areas with steeper topography. Coca is often grown in monocrop fields cut out of the triple canopy rainforest of the Amazon Basin. In this context the precision of the pilots is crucial, as is the use of a herbicide mixture that allows for rapid restoration of natural vegetation once the coca has been killed. The reemergence of native vegetation occurs very quickly after glyphosate application, ensuring that soil erosion will be minimal.

**Spray parameters:**

Spraying is conducted in Colombia under rigid parameters laid out by the GOC's Environmental Auditor to the spray program. Missions are cancelled if wind speed at the airport is greater than 10 m.p.h., if relative humidity is below 75 percent, or if temperature is over 32°C (90°F) - to avoid drift that might come from a temperature inversion. Spray missions are planned so as to avoid spraying wet coca; the goal is to have no rain on the targeted fields from two hours before to four hours after the spraying. Spraying most often takes place in the morning when weather conditions are favorable in the spraying area, although spraying can take place any time of day when the above conditions are satisfied. Poor atmospheric conditions often are the cause of mission cancellations. For example, in 1998 and 1999, spraying took place on an average of 125 days out of the year. During the other 240 days, the spray planes were grounded, with the majority of cancellations due to bad weather.

While flight lines are programmed using the reconnaissance procedures outlined above, pilots are instructed and trained to activate their aircraft spray systems only when they have positively identified coca directly in their spray line. Spray planes are under continual risk from hostile ground fire, yet the pilots spray as low over the coca fields as obstacles (e.g. trees) and security conditions will permit. The altitude above spray targets while spraying is normally less than 100 feet. Under the conditions in which the aerial eradication program is carried out in Colombia, spray pilots face great risks. Over the seven years of the aerial coca eradication program in Colombia, three spray pilots have lost their lives by striking their aircraft against the ground or trees while trying to spray as close to the illicit crop as possible.

The pilot of each eradication aircraft is responsible for deciding when damage to non-target foliage is likely to occur and to take every measure to avoid such collateral damage and spray only within the boundaries of the coca field. Pilots are licensed and trained to be conscious of wind direction and speed during spray operations to avoid unintentional damage to any legal crops. According to Colombian law, food crops that are interspersed with coca are subject to spraying. Nonetheless, great care is taken to avoid spray damage to legal crops and the spraying of any area that does not contain coca. While every effort is made to minimize human and mechanical mistakes, occasional errors are unavoidable. The GOC has implemented improved procedures to investigate claims of spraying of legal crops and to compensate owners if damage is found to be credible.

**Spraying and human and environmental health:**

Glyphosate is one of the most widely used agricultural herbicides in the world. It has been tested extensively in the United States, Colombia, and elsewhere. EPA approved glyphosate for general use in 1974 and re-registered it in September 1993. In its latest comprehensive review of studies on glyphosate, the EPA concluded that proper use of glyphosate, as permitted in the U.S., would not cause unreasonable adverse effects in humans or the environment.

The product label advises that the concentrated formulation of the glyphosate product causes irreversible eye damage, is harmful if swallowed or inhaled, and may cause skin irritation. These precautionary statements are determined according to EPA policy and are based on the results of testing on laboratory animals. INL does not believe that the spray program exposes humans who may be present in a sprayed field to such risks. This is because the irritation and toxicity potential of the individual ingredients are reduced when diluted during mixing (the final product is approximately 75 percent water) and the mixture is dispersed when sprayed. Thus humans who may be present under the swath of the plane are not exposed to levels that approach the commercial glyphosate formulation in its concentrated, undiluted form. The symptoms of such exposure are likely to be short-term and reversible. Furthermore, any one individual field is unlikely to be sprayed more than one time in a year, lowering the levels of repeated potential human exposure.

To minimize human exposure to the spray mixture, pilots are instructed to avoid flights over towns and populated areas and, during spray missions, to avoid spraying near people, homes, or occupied buildings.

Studies on livestock (cows, goats, and chickens) show livestock absorb limited amounts of glyphosate. Permitted levels of glyphosate in/on crops and livestock for human consumption are published in the Code of Federal Regulations, Title 40 (40 CFR), Section 180.364. EPA has concluded that consumption of crops treated with glyphosate and livestock fed with forage treated with glyphosate in the U.S. does not pose a dietary concern when residues are below these published tolerances. With respect to environmental impact, EPA concluded, based on required and available scientific studies, that glyphosate is not persistent in soil, does not build up after repeated use, and is biologically degraded over time by soil microbes. Because it binds tightly with the soil, glyphosate is unlikely to leach into underground drinking water. These qualities make glyphosate a well-suited herbicide for use against coca in Colombia.

Studies have shown glyphosate itself to be "practically non-toxic" to fish, however some glyphosate end-products may contain other ingredients that may increase the toxicity to fish when they are exposed. In accordance with the instructions on the product label, pilots are instructed to avoid all bodies of water when spraying coca.

**Eradication oversight:**

Spray pilot oversight is carried out by several entities. Pilot performance is monitored by the GOC's Environmental Auditor, the Colombian National Police (CNP), INL's Office of Aviation, the Narcotics Affairs Section (NAS) of the U.S. Embassy, Department of State contractor personnel, USDA weed scientists, and the GOC's National Directorate of Dangerous Drugs. The Environmental Auditor, the CNP, and the contractor personnel are continually on-site in the bases or airports from which the spray planes operate and in most cases accompany the spray missions themselves. All of the above-mentioned offices actively participate in the ground truth verification of randomly selected, previously sprayed fields. These verifications usually take place twice a year. During this process, one of the important elements is an assessment of potential overspray or non-target drift, essential indicators of spray pilot (and herbicide) precision. These ground truth verification missions have found very few instances of spray pilot error and have reported that pilot accuracy is excellent and overspray minimal.

Unfortunately, human and mechanical error is possible and mistakes are made on occasion. In the past, many complaints of erroneous spraying of legal crops have proven groundless after subsequent investigation. However, INL believes that the credibility of the spray program is enhanced by a speedy and fair review of all complaints and by just compensation for any legal crops that were indeed sprayed in error. With support from the United States, the GOC's process of investigating harm to legal crops has recently been improved to provide for faster investigation and resolution of complaints.

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## Response from EPA Assistant Administrator Johnson to Secretary of State, August 19, 2002

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

The Honorable Colin L. Powell, Secretary  
U.S. Department of State  
Washington, D.C. 20520

Dear Secretary Powell:

We are enclosing our consultation review as per your request to Environmental Protection Agency (EPA) Administrator Christine Todd Whitman, for consultation on the potential human health and environmental effects of the aerial coca eradication program in Colombia, pursuant to the Foreign Operations, Export Financing, and Related Programs Appropriation Act (P.L. 107-115). Administrator Whitman has asked me to respond on her behalf because my office has primary oversight responsibility for pesticides, and the nature of this consultation centers around the technical aspects of chemicals used in the aerial fumigation of coca.

The Foreign Operations, Export Financing, and Related Programs Appropriation Act specifically requires the Department of State to consult with EPA on whether (1) "aerial coca fumigation is being carried out in accordance with regulatory controls required by the EPA as labeled for use in the United States .... ; and (2) whether the chemicals used in the aerial fumigation of coca, in the manner in which they are being applied, do not pose unreasonable risks or adverse effects to humans or the environment..."

As part of our consultation review, we considered the full range of available scientific information from laboratory and field testing and incident reports. Our consultation review evaluates the potential impact to human health and the environment from the eradication program, based on information provided by Department of State, on the pesticide used (glyphosate), inert ingredients, and the application rates and methods. In addition, Agency scientists reviewed scientific studies on glyphosate, conducted a limited literature search for human health incidents related to glyphosate use, and examined information on glyphosate use conditions in the United States. We also considered information provided by non-governmental organizations, concerning effects reportedly connected to coca eradication in Colombia.

Glyphosate is widely used in the United States. Based upon EPA reviews of domestic use conditions, glyphosate appears to be one of the most safely-used pesticides in the U.S. EPA's regulatory authority for domestic pesticide use allows significant controls through pesticide labeling and compliance and enforcement infrastructure implemented with the states and other federal agencies. Recognizing that these mechanisms are not available to EPA in Colombia, the Agency has evaluated potential risks associated with the coca eradication program and identified areas where Department of State should pay particular attention to minimize the potential for adverse effects.

I trust that the attached document will assist you in preparing your response to Congress. Please let me know if you have additional questions concerning this consultation review.

Sincerely,

Stephen L. Johnson

Assistant Administrator

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**U.S. Environmental Protection Agency Office of Pesticide Programs Details of the Consultation for Department of State Use of Pesticide for Coca Eradication Program in Colombia, August 2002**

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**EXECUTIVE SUMMARY**

**CONSULTATION REVIEW OF THE USE OF PESTICIDE FOR COCA ERADICATION IN COLOMBIA**

**BACKGROUND**

The Department of State currently assists the Government of Colombia with training, contractor support, financial assistance, and technical and scientific advice for an aerial pesticide spraying program designed to eradicate illicit crops (coca and poppy). In accordance with a provision in its 2002 Appropriations Bill, Department of State has consulted with the U.S. Environmental Protection Agency (EPA) on two specific questions: that fumigation is "...being carried out in accordance with regulatory controls required by the Environmental Protection Agency as labeled for use in the United States" and, that the chemicals being used "...in the manner they are being applied, do not pose unreasonable risks or adverse effects to humans or the environment."

**FINDINGS**

EPA has reviewed information provided by Department of State concerning the pesticide formulation applied (combination of the pesticide active ingredient, glyphosate, and inert ingredients), and application rates and methods. According to the most recent figures (1999 sales and usage) glyphosate is the most widely used conventional pesticide in the United States. The Agency evaluates all pesticides used in the U.S. to determine whether they meet the U.S. safety standard of no unreasonable adverse effects. Consequently, EPA has a significant amount of information about glyphosate from a health and environmental standpoint because of our reviews of use conditions in the U.S. In the U.S., the Agency can assure significant controls on use and potential health and environmental impacts through the pesticide label, and through a state infrastructure which governs label compliance to address issues such as drift and worker and bystander exposure.

Based on a comparison of the glyphosate use pattern in Colombia, as described by the Department of State, and use in the U.S., EPA determined that the most equivalent U.S. uses of glyphosate would be forestry or rights-of-way. The glyphosate product which has been identified to us as used in Colombia is registered in both the U.S. and Colombia, although it has never been marketed in the U.S. The Agency found application rates described as used in Colombia to be within the parameters listed on U.S. labels. The addition of a spray adjuvant (to facilitate the formulation adhering to and penetrating the coca plant) is also in keeping with U.S. practice. While the specific spray adjuvant product identified as that used in Colombia is not sold in the U.S., similar substances and products are commonly used. Most U.S. labels for forestry and right-of-way use of glyphosate suggest application by helicopter. Since application in Colombia is done by fixed-wing aircraft, it is likely conducted at a higher speed and from a greater altitude, than would be typical in the U.S. Department of State has assured the Agency that mixers/loaders and applicators of the glyphosate formulation receive training comparable to U.S. label requirements for glyphosate products including the use of personal protective equipment such as gloves and goggles.

As for potential human health effects of the coca eradication program, there are no risks of concern for glyphosate, *per se*, from dermal or inhalation routes of exposure, since toxicity is very low. There is concern for acute eye toxicity due to an inert ingredient in the glyphosate formulated product used to treat coca. The potential eye effects are related to an inert ingredient, not the glyphosate itself, and greatest potential for exposure is expected for workers mixing and loading the concentrated glyphosate product. The components of the spray adjuvant, Cosmoflux 411F, are substances with low oral and dermal toxicity that have been approved for use in/on food by EPA and the Food and Drug Administration. There are no expected toxicological effects of concern for acute (short-term) or chronic (long-term) dietary exposure through food and water from the coca eradication program. Incident data from Colombia involving humans, livestock, mammals and birds, are based on potential exposure to glyphosate from fumigation of poppy fields, which may differ from use of and exposure to glyphosate from coca eradication, so conclusions should be made cautiously.

Relative to the potential environmental effects of the spraying program based on U.S. data, phytotoxicity to non-target plants outside of the application zone would be expected, since glyphosate is a broad spectrum herbicide. Given the application method described by Department of State, offsite exposure from spray drift is probable, as it would be under similar uses in the U.S. This proposed use of glyphosate itself does not appear to pose a significant direct risk to terrestrial or aquatic animals, although secondary adverse effects from the temporary loss of habitat in the spray area could occur. EPA would not expect any risk to birds and mammals, including livestock, based on dietary exposure to the active ingredient glyphosate. Anticipated effects to animals are based on an extrapolation of data related to North American species. Glyphosate does not have a high potential to leach to ground water or reach surface water as dissolved runoff but does have potential to contaminate surface water as a result of residues suspended in runoff water. A more refined assessment is difficult due to uncertainty regarding the exact formulation of the spray solution.

As part of its consultation, EPA reviewed available scientific studies and information on the human health and environmental effects of glyphosate and the inert ingredients and on exposure pathways; conducted a literature search for human health incidents related to glyphosate use in the U.S.; and summarized use patterns for glyphosate in the U.S., including use sites, methods and rates of application, and differing formulations. In addition, the Agency considered information, provided by non-governmental sources, concerning adverse effects reportedly connected to the eradication program.

Details of the Agency's findings are provided in the attached document.

### **SECTION 1. Description of Glyphosate Use in the U.S. for Comparison to Use in Colombia for Coca Eradication**

**INTRODUCTION:** The Biological and Economic Analysis Division (BEAD) within the Office of Pesticide Programs, Environmental Protection Agency, has been asked to describe the use of glyphosate within the United States with a more detailed description of its use in forestry sites so that methods of use in the United States may be used as a basis for comparison for coca eradication in Colombia (1).

**SUMMARY:** Glyphosate is the herbicide most widely used in the United States<sup>1</sup> (2). In agriculture this popularity is due, in large part, to the development of crops that are highly tolerant to broadcast applications of glyphosate which allows growers to use this non-selective herbicide as their principal method of weed control in certain crops. Growers have rapidly adopted glyphosate-based weed control programs with glyphosate tolerant crops because they are simple and economical (3). In addition, due to its unique properties, glyphosate is also widely used for non-agricultural weed control situations including home lawns and gardens, forestry and other non-crop sites where total vegetation control is desired.

<sup>1</sup>EPA's (BEAD's) biannual pesticide sales and usage report estimates that in 1999, glyphosate was the most used conventional

pesticide in the U.S. (83 to 95 million pounds of glyphosate applied) in all markets. It was second behind atrazine in the agricultural market (67 to 73 million pounds of glyphosate applied); and second behind 2,4-D in the non-agricultural market (16-22 million pounds of glyphosate applied). In the agricultural market, data for 2000 and 2001 suggest that the usage of glyphosate has increased to as much as 100 million pounds. Data is not yet available for 2000 and 2001 for the non-agricultural market.

Glyphosate must be applied to the target plant's foliage to be effective. Glyphosate is non-selective in action, controlling a wide variety of plants. Once absorbed, it circulates to untreated portions of the plant; and it has no residual activity after contact with soil. Glyphosate may be applied using hand-held, ground-driven or aerial equipment; the choice of equipment is determined by the site to be treated. Although higher rates of application are allowed, actual rates per application in agricultural sites average less than 0.75 pounds of the active ingredient glyphosate per acre (Table One). For the non-agricultural site, forestry, use is allowed at rates per application ranging from 2 to 10 pounds per acre (2.2 to 11.2 kilograms of active ingredient/ hectare) of glyphosate in the form of the isopropylamine salt (6). This rate of use may also be expressed as 1.5 to 7.5 pounds per acre of acid equivalent (pure glyphosate; not a salt). A more detailed discussion of the use of glyphosate in the U.S. follows.

**USE OF GLYPHOSATE IN THE UNITED STATES:** Products containing glyphosate are registered with the U.S. Environmental Protection Agency, which means they may legally be used within the United States if used in accordance with label instructions.

Glyphosate may be used on over 400 crop and non-crop sites. The largest agricultural use sites include soybeans, cotton and field corn. The following table summarizes estimates the use of glyphosate in three primary agricultural use sites.

Table One. 2000 Glyphosate Use in U.S. Agriculture: In Total and for the Three Major Use Sites

| Site          | Acres Grown (million acres) | Base Acres Treated (million acres) <sup>1</sup> | Percent of Crop Treated <sup>2</sup> | Total Acres Treated (million acres) <sup>3</sup> | Pounds Applied (million lbs ai) | Avg. Number of Apps | Avg. Application Rate (lbs ai/acre/app) |
|---------------|-----------------------------|---|--------------------------------------|--|---------------------------------|---------------------|---|
| All Ag. Sites | ◆                           | ◆   | ◆                                    | 102.7  | 73.5                            | ◆                   | ◆                                       |
| Corn          | 73.8                        | 6.6   | 9%                                   | 7.3  | 4.4                             | 1.1                 | 0.59                                    |
| Cotton        | 14.4                        | 8.1   | 56%                                  | 13.8   | 9.5                             | 1.7                 | 0.67                                    |
| Soybeans      | 71.0                        | 44.0  | 62%                                  | 57.2   | 41.8                            | 1.3                 | 0.68                                    |

Source: USDA, National Agricultural Statistics Service (NASS) 2000 field crop chemical use (May, 2001), and EPA proprietary data.

<sup>1</sup>Base acres treated = acres treated 1 or more times with glyphosate.

<sup>2</sup>Percent of crop treated = base acres treated with glyphosate divided by acres grown.

<sup>3</sup>Total acres treated = base acres treated with glyphosate multiplied by the average number of applications of glyphosate.

In addition to agricultural use, EPA estimates that 16-22 million pounds of the technical grade active ingredient were applied to non-agricultural sites in 1999 (this is the most recent year for which adequate data are available). The estimate includes both home owner and professional applications as well as use on forested lands (11). Based on EPA data for 1999, an estimated 1-2 million pounds of glyphosate was applied to forest acres, with more than 650,000 forest acres treated.

**AGRICULTURAL SITES:** In certain annual crops, glyphosate may be applied before planting (preplant) to control existing weeds; often replacing tillage as a weed control measure in "no-till" crop culture systems designed for reducing soil erosion. However, most of the glyphosate currently used in agricultural sites is used in a cropping system employing crop varieties that have been developed to be resistant to glyphosate so that glyphosate may be applied "over-the-top" of the resistant crop to kill susceptible weeds. The most prevalent of these systems is the Round-up Ready Soybean system. These soybeans, which are highly tolerant to glyphosate, were marketed starting in 1996. Since then this system has been widely and rapidly adopted; in 1990-1991, glyphosate ranked 11<sup>th</sup> among conventional pesticides used in the U.S. with annual use estimated to be 18.7 million pounds (4). In 2000, glyphosate was the most widely used herbicide in soybeans; nearly 42 million



pounds of glyphosate were applied to soybeans alone (2) with over 60 percent of soybeans surveyed by USDA's National Agricultural Statistical Service treated with glyphosate (5). Round-up, a glyphosate product marketed for agricultural use is formulated with a surfactant during manufacture to facilitate foliar absorption. The following table (Table Two) summarizes the use rates specified in label instructions for Roundup Original™ product herbicide concentrate (12) which contains the isopropylamine salt of glyphosate for use in glyphosate-tolerant soybeans.

Table Two. Allowed Rate of the Isopropylamine Salt of Glyphosate Per Application in Tolerant Soybeans

| Maximum for Application Timing   | Quarts of Product/Acre | Pounds of Active Ingredient/Acre | Kilograms of Active Ingredient/Hectare |
|----------------------------------|------------------------|----------------------------------|--|
| For Entire Season                | 8                      | 8                                | 9                                      |
| Before Crop Emergence            | 5                      | 5                                | 5.6                                    |
| In Crop                          | 3                      | 3                                | 3.4                                    |
| Up to Two Weeks Prior to Harvest | 1                      | 1                                | 1.1                                    |

**NON-AGRICULTURAL USES INCLUDING FORESTRY:** BEAD has been asked to describe the use of glyphosate in U.S. forestry sites since that use most closely corresponds to the use of glyphosate in Colombia for coca control. For simplicity this document only refers to Accord which is intended specifically for forestry use (6). This product contains the isopropylamine salt of glyphosate (41.5%), and is labeled for non-agricultural uses including Forestry Site Preparation and Utility Rights-of-Way, Forestry Site Conifer and Hardwood Release, and Wetland Sites in the U.S. Table Three describes the rates at which it may be used. It is recommended for use in site preparation prior to planting any tree species, including Christmas tree and silvicultural nursery sites (7). Specific methods of application for forestry uses include: aerial spraying; spraying from a truck, backpack or hand-held sprayer; wipe application; fill treatment; cut stump treatment (7).

For forestry site preparation it may be applied using either ground or aerial equipment at rates from 2 to 10 pounds glyphosate active ingredient per acre which is equivalent to 2.2-11.2 kilograms of active ingredient per hectare (Table Three). It may also be applied using hand-held equipment. Product instructions specify that a non-ionic surfactant be added to the spray mixture for all forestry uses at a rate of 0.5 to 1.5 percent by spray volume (2 to 6 quarts of surfactant per 100 gallons of spray solution). It may also be combined with certain residual herbicides to extend the period of weed control beyond that obtained with glyphosate alone.

The isopropylamine salt of glyphosate may also be used in forestry conifer and hardwood release as a directed spray or by using selective equipment. This product may also be used in or around wetland sites generally at no more than 5 quarts of product per acre (5 lbs isopropylamine salt of glyphosate per acre which is equal to 5.6 kg/ha) using over-water broadcast application (5).

Table Three. Rate of Isopropylamine Salt of Glyphosate Per Application For Certain Use Sites

| Use Site  | Quarts of Product/Acre | Pounds of Active Ingredient/Acre | Kilograms of Active Ingredient/Hectare |
|---|------------------------|----------------------------------|--|
| Forestry Site Preparation and Utility Rights-of-Way | 2-10                   | 2-10                             | 2.2-11.2                               |
| Forestry Site Conifer and Hardwood Release          | 2-10                   | 2-10                             | 2.2-11.2                               |
| Wetland Sites                                       | 2-5                    | 2-5                              | 2.2-5.6                                |

**PROPERTIES OF GLYPHOSATE:** Glyphosate is a foliar-active herbicide; to exert herbicidal properties it must enter the plant through foliage (or in some cases, the stem). Glyphosate applied to foliage is absorbed by leaves

and rapidly moves through the plant. It acts by preventing the plant from producing an essential amino acid. This reduces the production of protein in the plant, and inhibits plant growth.

Glyphosate has systemic activity, meaning that it circulates through the plant's vascular system; affecting the entire plant, not just the treated foliage. Other foliar-active herbicides, like paraquat for example, are contact herbicides; affecting only the portion of the plant onto which they are applied. After treatment with a contact herbicide, a plant may then regrow from untreated portions, often necessitating re-treatment for complete control. The advantage to a systemic herbicide is that if applied at an appropriate dose, it can kill an entire plant, thus preventing regrowth from an untreated plant part such as a root.

Glyphosate has no residual activity, once adsorbed to soil it quickly becomes unavailable to plants and no longer has herbicidal activity. This means that a plant that would ordinarily be susceptible to glyphosate can be planted shortly after an application of glyphosate; this is common practice in U.S. agriculture. In contrast, some herbicides have month-long or even year-long residual activity which limits the plants that may be grown following their use.

Glyphosate is non-selective. Some herbicides are selective in their action, controlling only grassy weeds in a broadleaf crop like soybeans, for example. However, glyphosate exerts herbicidal action on a variety of plants; it is active on grasses, herbaceous plants including deep rooted perennial weeds, brush, some broadleaf trees and shrubs, and some conifers. However, glyphosate does not control all broadleaf woody plants. Plants vary in their susceptibility to glyphosate, so the treatment of dose is important. Plants of certain species and older plants are less susceptible to glyphosate. Timing is critical for effectiveness on some broadleaf woody plants and conifers.

**FORMULATIONS OF GLYPHOSATE:** Glyphosate and four salts of the parent glyphosate molecule are currently used as active ingredients in registered pesticide products in the U.S.(9). These products are registered with the U.S. EPA for use in the U.S. in many different crop, non-crop, industrial and residential sites.

Table Four. Number of Products and Sites for Different Formulations of Glyphosate

| Active Ingredient   | Number of Products           | Number of Sites |
|---------------------|------------------------------|-----------------|
| Glyphosate acid     | 28                           | more than 250   |
| Ethanolamine salt   | 2                            | more than 200   |
| Ammonium salt       | 16                           | more than 300   |
| Isopropylamine salt | 237                          | more than 400   |
| Trimesium salt      | 6                            | more than 100   |
| Sesquisodium salt   | no currently active products | no active sites |

**GLYPHOSATE USED WITH SURFACTANT FOR FOLIAR ABSORPTION:** Since glyphosate is only effective if absorbed by plant foliage, glyphosate is combined with a surfactant to facilitate its absorption. Many herbicide concentrates, including glyphosate, are mixed with water before application. Without a surfactant, the aqueous spray mixture is repelled by the plant's waxy cuticle layer ("beads up"), and quickly runs off the plant's surface, preventing absorption.

Surfactants are commonly used as wetting agents with herbicides and in other products such as laundry and dishwashing detergent. Non-ionic surfactants, which are comprised of alcohols or fatty acids and considered an all-purpose surfactant are commonly used with glyphosate-containing products. Surfactants are frequently added during manufacture of the herbicide concentrate. If not, a non-ionic surfactant is generally mixed with the herbicide and water before spraying to enable the liquid to make better contact with the waxy cuticle of the plant. These glyphosate products, which are formulated without a surfactant, are considered "non-loaded" (10).

A short description of international usage of glyphosate, including Colombia, appears after the following references to the above discussion.

**REFERENCES:**

- (1) Description of Use of Glyphosate in Coca Eradication in Colombia in attachment to a letter from Secretary of State Colin Powell to Environmental Protection Agency Administrator Governor Christine Whitman.
- (2) Donaldson, D., T. Kiely, and A. Grube. Pesticide Industry Sales and Usage, 1998 and 1999 Market Estimates. June 2002. Biological and Economic Analysis Division, Office of Pesticide Programs, U.S. Environmental Protection Agency.
- (3) Gianessi, L.P., Silvers, C., Sankula, S., and Carpenter, J. Plant Biotechnology: Current and Potential Impact for Improving Pest Management in U.S. Agriculture - An Analysis of 40 Case Studies. June 2002. National Center for Food and Agricultural Policy.
- (4) Glyphosate - Reregistration Eligibility Decision. United States Environmental Protection Agency. September 1993.
- (5) Agricultural Chemical Usage - 2000 Field Crops Summary. May 2001. United States Department of Agriculture. National Agricultural Statistics Service.
- (6) Accord ♦ Herbicide Specimen Label. Available on-line from CDMS.
- (7) Pesticide Fact Sheet. Prepared for the U.S. Department of Agriculture, Forest Service.
- (8) D. Lantagne., M. Koelling, and D. Dickman. Effective Herbicide Use in Christmas Tree Plantations. Michigan State University Extension.
- (9) U.S. Environmental Protection Agency, Office of Pesticide Programs. Search of the Reference Files System dated June 11, 2002.
- (10) Miller, P., and P. Westra. Crop Series: Production. Colorado State University.
- (11) EPA Proprietary Information
- (12) Roundup Original Herbicide™ Supplemental Labeling for Postemergence Applications to Soybeans with Roundup Ready ♦ Gene. Available online from CDMS.

BEAD was asked to report on the use of glyphosate in forestry sites since it seemed similar to the use pattern for coca eradication. However, it is not clear how closely this use approximates that for coca eradication. Glyphosate is typically applied to forestry sites using helicopters at air speeds of 50-70 knots (about 60-80 miles per hour). Application to forestry sites by fixed wing aircraft, if practiced at all, is extremely rare (1). The recommended rate of application for pine release (conifer release) is 1.5 to 2 pounds active ingredient per acre.

Aerial application to other sites comprises less than one percent of the total amount of glyphosate applied in the United States (3).

In addition to surfactants, drift control agents may be added to the spray mixture for forestry uses in an effort to prevent drift to off target sites. BEAD has not investigated the prevalence of use or the effectiveness of these products.

BEAD estimates total global use of glyphosate to be between 350 and 360 million pounds of glyphosate per year. Annual use in the United States approaches 100 million pounds of active ingredient and an estimated 250 to 260 million pounds of glyphosate is used outside of the United States. Use of glyphosate in Colombia accounts for between four and five million pounds of this use. Primary sites in Colombia include coffee, bananas, pasture-land and rice (3).

#### REFERENCES:

- (1) Personal communication between Virginia Werling, United States Environmental Protection Agency and John Taylor, United States Forest Service on August 9, 2002.
- (2) Hamilton, R.A. "2002 North Carolina Agricultural Chemicals Manual - Chemical Weed Control In Forest Stands" Extension Forest Resources Department, North Carolina State University. Available on-line at <http://ipm.ncsu.edu/agchem/chptr8/821.pdf>
- (3) United States Environmental Protection Agency Proprietary Data.

#### **SECTION 2. Human Health Risk Assessment for the Use of Glyphosate Herbicide as Part of the Aerial Eradication Program of Coca in Colombia, S.A.**

#### **I INTRODUCTION**

The Department of State has requested that the US Environmental Protection Agency (EPA), Office of Pesticide Programs (OPP) provide a human health risk assessment for the aerial coca eradication in Colombia. The Department of State (DoS) has requested that the risk assessment address whether or not the aerial eradication program in Colombia is being carried out in accordance with regulatory controls required by the EPA as labeled for use in the United States, and the chemicals used, in the manner in which they are being applied, do not pose unreasonable risks or adverse effects to humans and or the environment. According to information provided by DoS, the eradication program, includes the use of a spray mixture of a glyphosate containing pesticide product, an adjuvant (Cosmo-Flux 411F) and water. The glyphosate tank mixture is applied in an over the top aerial foliar application in certain provinces within Colombia. To facilitate the request, the DoS met with members of OPP on April 18 and sent a written request, dated May 8, 2002, with documentation on the coca eradication program, including a description of the pesticide spray mixture components, application methods, target site identification, and potential exposures. DoS also supplied EPA with incident reports for aerial eradication of illicit poppy in Colombia.

The Field and External Affairs Division (FEAD) of OPP, which has the responsibility of managing the EPA's role of providing technical information and assistance to DoS for this program, forwarded the DoS request to Health Effects Division (HED), the Environmental Fate and Effects Division (EFED), and the Biological and Economics Assessment Division (BEAD) for scientific assessments. The HED of OPP is charged with estimating the risk to human health from exposure to pesticides. Registration Action Branch 1 (RAB1), Reregistration Branch 1 (RRB1) and the Chemistry and Exposure Branch (CEB) of HED as a team have performed the assessment requested by the Department of State and have evaluated the potential hazard, exposure, and risk to human health from the U.S. supported coca eradication program Colombia.

A summary of the findings and an assessment of human risk resulting from the use of glyphosate in Colombia to eradicate coca is provided in this document.

Unless otherwise specified, all information pertaining to the U.S. supported coca eradication program in Colombia was provided to the Agency from two sources: (1) Department of State (DoS) Presentation, DoS Coca Eradication Program, 4/18/02, (2) DoS document entitled Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application.

## **II EXECUTIVE SUMMARY**

### *USE PATTERN*

According to the State Department, the glyphosate tank mixture is applied as an over the top aerial foliar application to coca in certain provinces within Colombia. The tank mixture sprayed for eradication of coca in Colombia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). Up to two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons of product/Acre. In order to assess the hazard of what was sprayed in Colombia, components of the mixture were evaluated separately.

### *HAZARD ASSESSMENT*

The **Cosmo-Flux 411F** adjuvant used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. All ingredients identified as contained in this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. Cosmo-Flux 411F consists mainly of (*information not included as it may be entitled to confidential treatment*) with a nonionic surfactant blend primarily composed of (*information not included as it may be entitled to confidential treatment*).

The available hazard data base on experimental animals indicates that the **Glyphosate** technical grade active ingredient (TGA) has low acute toxicity via the oral and dermal routes. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2 generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which resulted in evidence of appreciable parental toxicity.

The Food Quality Protection Act (FQPA) Safety Factor Committee (SFC) concluded that the safety factor, to protect infants and children, of 10x be removed (reduced to 1x). The Hazard Identification Assessment Review

Committee (HIARC) met on March 26, 1998 and, again, on November 20, 2001. The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary exposure and residential/occupational exposure. No endpoints were selected for the acute Reference Dose (RfD) since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no concerns for developmental or reproductive toxicity. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term 1-30 days, intermediate term- 1 to 6 months, or long term- 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate. HIARC did identify an incidental oral endpoint for short- and intermediate-term exposure. The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. Glyphosate was not mutagenic in a full battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a "Group E" chemical (no evidence of carcinogenicity to humans).

#### EXPOSURE

An exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential for exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for acute dietary, dermal, or inhalation exposures. Therefore, quantitative estimates of risk for these exposure durations have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002).

Acute **dietary exposure** is possible for persons consuming livestock or food crops which have been inadvertently sprayed as a result of the aerial eradication program in Colombia. However, since glyphosate is a contact herbicide that systemically kills plants after absorption through leaves, dietary exposure due to consumption of treated crops is expected to be limited. In addition, since an acute dietary endpoint was not identified in the hazard database, no significant risk due to acute dietary food exposure to glyphosate residues is expected. Based on the fact that a coca field is sprayed no more than twice to eradicate the crop, no chronic food exposure is expected.

**Handler (e.g., individuals mixing the concentrated formulated product to prepare the tank mix and loading the tank mix in the aircraft) exposure** is anticipated for short-term (1-30 days) and, possibly intermediate-term (1-6 months) durations based on the frequency of application and duration of the spray program.

Based on the use pattern described by the DoS, short-term dermal **post-application exposures** are expected for persons pruning, or leaf pulling treated coca plants immediately after spray events. In cases such as glyphosate, where the vapor pressure is negligible, OPP experience with post-application data suggests that inhalation exposure is minimal and OPP does not quantitatively assess post-application inhalation exposure. Intermediate- and long-term post-application exposures are not expected due in part to the fact that a coca field is sprayed twice to eradicate the crop. Additionally, glyphosate is a translocated herbicide which is rainfast within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal.

DoS states that pilots are instructed not to spray fields where people are present. Therefore, incidental oral exposure (hand-to-mouth) resulting from individuals being directly sprayed by glyphosate was not assessed. Non-dietary incidental oral exposure was not quantitatively assessed for the use of glyphosate in Colombia.

There is potential for exposure to bystanders in areas near those targeted for spraying. However, the technology and other safeguards described by DoS as being used in this program are consistent with common approaches in the United States for reducing **spray drift**. Therefore, it is likely that drift is minimized in this program if all procedures are adhered to and operational equipment is in working order.

From the review of Colombian glyphosate product human **incident reports** for poppy eradication, it should be emphasized that the overwhelming majority (95%) of the illnesses reported are likely background incidents unrelated to the spraying of herbicide to poppy. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incidence data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There are data to suggest that the poppy spray eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region

studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

A direct comparison of the epidemiological data in Colombia (which is from aerial application to poppy) to the conditions of use, (as presented at the April 18, 2002 briefing for aerial application to coca by DoS to OPP risk assessors), would be limited. The briefing and the materials provided did not address the conditions of use for poppy. Nor was the Agency provided any human incident data for the coca eradication program. Subsequent to the April 18 briefing HED received an e-mail communication from OPP/Field and External Affairs Division, stating that DoS informed EPA that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. The Agency also has questions as to the geographical area differences, the frequency of repeated applications, and the size of the area treated on each spray mission. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

The *glyphosate formulated product* used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* is classified as toxicity category III for primary eye irritation and toxicity category IV for acute dermal and oral toxicity, and skin irritation. It is not a dermal sensitizer. However, the surfactant used in the *formulated* product reportedly can cause severe skin irritation and be corrosive to the eyes, as would be expected for many surfactants. The label for the *formulated* product used in the coca eradication program in Colombia includes the "Danger" signal word. These findings suggest that any of the reports of toxicity to the eye may be due to the surfactant, not glyphosate per se. The product has been determined to be toxicity category I for eye irritation, causing irreversible eye damage.

There may be a correlation between the ocular toxicity caused by the surfactant and reported incidents of ocular effects. This is supported by data obtained from the California Pesticide Illness Surveillance Program (1982-2000). In 1992 the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that use of the reformulated glyphosate product since 1992, has resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to reduction in eye injuries.

The greatest potential for **eye exposure** is expected for workers mixing and loading the concentrated glyphosate product. There is also the potential for eye exposure as a result of entering treated fields after treatment to perform pruning or harvesting activities.

During an April 18 briefing, the Department of State agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix. To date this information has not been received. Until such information is supplied to the Agency, EPA cannot evaluate the potential ocular or dermal toxicity resulting from direct contact with the tank mixture. Therefore, due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternative glyphosate product (with lower potential for acute toxicity) in future coca and/or poppy aerial eradication programs.

### **III BACKGROUND**

EPA regulates pesticides under two statutes, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). FIFRA provides the authority to register and review pesticides as well as the authority to suspend and cancel if use poses unreasonable risks. FFDCA provides authority to set maximum residue levels (tolerances) for pesticides used in or on foods or animal feeds.

Section 3 of FIFRA provides authority to register (license for sale and distribution) pesticide products. The label of the pesticide product specifies the use (pest and crop/site), amount of product to be applied, frequency, timing of use, restrictions, storage and disposal practices and precautionary statements. The active ingredient in a pesticide product is the "ingredient which will prevent, destroy, repel, or mitigate any pest." The inert or other ingredient(s) in a pesticide product is "an ingredient which is not active." The registrant must provide data for the Agency to assess potential environmental and human health risks. The data required to make a safety finding

are dependent on the intended use, e.g., food use vs non-food use. The data requirements for pesticides may be found in 40 CFR Part 158. For human health risk assessment, data is required to permit characterization of hazard and exposure.

Data requirements on the chemical identity and composition of the formulated pesticide product, may be found in 40 CFR 158.150. The list of ingredients for a pesticide product and the percent of each ingredient in the formulation are contained in the confidential statement of formula (CSF). The CSF is FIFRA confidential business information (CBI) and is entitled to treatment as trade secret or proprietary information. Agency risk assessments do not typically contain this information. **In finalizing the current document, FEAD and HED consulted with OPP's Information Resources and Services Division/Public Information and Records Integrity Branch regarding CBI. It was determined that the document did contain some CBI and therefore, some sections have been adapted.**

Residue chemistry data required as per 40 CFR 158.240 support the ability of the Agency to estimate the amount of pesticide that will result in food as a result of application of the pesticide according to the product labels directions for use. The magnitude of the residue studies for crop field trials use the typical end use product as the test material. The livestock feeding studies are required whenever a pesticide residue will be present in livestock feed. The livestock feeding studies evaluate the magnitude of the resulting pesticide residue in meat, milk, poultry, and eggs. The studies are conducted with the technical grade of the active ingredient or the plant metabolites. Residue chemistry data are also required to identify any potential metabolites of concern. These data are used to determine the tolerances for the parent and or metabolites. Additional data is required on environmental fate, degradation, metabolism, and dissipation.

Hazard data required for human health risk assessment are provided in 40 CFR 158.340. The use of the active ingredient (i.e., food use or non-food use) will determine what studies are required. The acute toxicity data on the technical grade of the active ingredient are used for classification and precautionary labeling for protective clothing requirements, and worker reentry intervals. The only studies that are required to be conducted on the manufacturing use product or end use product are the acute toxicity studies. The remaining toxicology studies (e.g., developmental toxicity, reproduction, subchronic, chronic feeding, or carcinogenicity studies) require that the test substance is the technical grade of the active ingredient. Subchronic toxicity studies provide data on potential target organ toxicity and are also used to select dose levels for long term or chronic toxicity studies. Chronic toxicity or carcinogenicity studies are conducted for food use chemicals to determine potential effects following prolonged or repeated exposure that may have a latency period for expression. The test animals are exposed orally for a significant portion of their life span. Developmental toxicity studies are required in two species (usually the rat and rabbit) for food use chemicals. They are conducted to detect alterations in the normal development of fetuses following *in utero* exposure. The 2-generation rat reproductive toxicity study is required to assess potential alterations in gonadal function, estrus cycles, mating, conception, birth, lactation, weaning, as well as growth and development of offspring. The Agency also requires a battery of mutagenicity studies to assess the potential induction of changes in the genetic material of cells. The above studies are required for food use active ingredients. In general, less data is required for non-food use active ingredients and inerts unless a concern has triggered additional testing.

The Agency conducts separate risk assessments for all pesticide active ingredients and has conducted risk assessments for some inerts. The remaining inerts are cleared by the Agency. It should be understood that whenever the inert ingredient was cleared, whenever the tolerance exemption was established, the inert met the standards of the time. Inert ingredients, also known as "other ingredients," are the carrier for the active ingredients which allow the product to deliver the active ingredient at a specific rate and ensure proper distribution during application. Currently there are over 3200 inert ingredients cleared by EPA for use in various domestic pesticides products. There are two major classifications: non-food use (such as lawn care products and bathroom cleaners), and food-use, which require an exemption from the requirement of a tolerance and can also be used in non-food products.

The Agency has a newly developed methodology for evaluating low or low/moderate toxicity chemical substances by way of a screening process that incorporates elements of a tiered approach (US EPA, May 2002). Use of this process will permit the Agency to clear more chemicals of low to moderate toxicity for use in pesticide products. The Agency is aware that some chemicals may be used as inert ingredients in some formulations and as active ingredients in other formulations. EPA believes this methodology is appropriate for evaluating some low toxicity chemicals regardless of whether they are categorized as active or inert ingredients. The new process will permit the Agency to be able to conduct more in-depth evaluations of other ingredients that are of potentially higher toxicity. Chemicals of higher toxicity that can not be appropriately addressed in the lower tiers would be evaluated in a manner substantially similar to that of an active ingredient. Later as the Agency begins to review chemical-specific or surrogate information in the open literature, the preliminary tier determination may be revised (US EPA, May 2002).

Inert ingredients that are exempt from tolerance are listed in 40 CFR 180.1001 (c). The inert ingredients in the glyphosate formulation have been approved by the Agency. The components of the adjuvant (Cosmo-Flux 411F), that DoS indicates have been sprayed on coca plants in Colombia have also been determined to be approved for use on food by the Agency.

The two federal statutes for regulating pesticides in the US give EPA limited authority to regulate the sale, or use of adjuvants in the US. EPA only has authority to regulate the pesticide product itself. For example, if a chemical in an adjuvant was intentionally included in the formulation of a pesticide product, the chemical would be regarded as an inert ingredient. In the US as with all countries, adjuvants are commonly used and added to pesticides as wetting agents, spreaders, emulsifiers, antifoamers, penetrants, or for other purposes. These may contain surfactants, solvents, or other types of chemicals to achieve the desired purpose.

An adjuvant is a subsidiary ingredient or additive product added to a pesticide in a mixture that aids the effectiveness of the primary or active ingredient. Adjuvants are most commonly added to tank mixes of pesticide products prior to application to the site to be treated. Adjuvants are not directly subject to FIFRA registration if no pesticidal claims are made. Pesticide manufacturers choose whether or not to address on their product labels the use of adjuvants with their product(s). However, when added to a tank mix for application to a food or feed crop/site, the individual components must be cleared under FFDC. While adjuvant products are not registered on the federal level, they are subject to registration under some state laws. The states of Washington and California are two states that register adjuvants. The adjuvant (Cosmo-Flux 411F) used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Department of State has agreed to provide the Agency with acute toxicity data performed on the actual tank mix that has been sprayed in Colombia.

#### **IV HISTORICAL REGULATORY INFORMATION**

The glyphosate product used in Colombia according to the Department of State was registered in the US in April 1974. From 1974-1992 the product was registered for use on a number of agricultural and nonagricultural sites. The product had a "Warning" signal word for eye irritation. In 1992, the registrant submitted an eye irritation study that was categorized as Toxicity Category I and required a "Danger" signal word. The registrant decided that they did not want to market a glyphosate product with a "Danger" signal word. Around July 1992, the registrant registered a reformulated glyphosate product for use in the United States that had the percentage of surfactant reduced to a level that produced Toxicity Category II eye irritation. The original product was re-labeled - "Not for use in the United States". Because the Agency never rescinded the registrations for the use sites that were on the initial label before it was changed, the product technically remains registered for use on numerous agricultural and nonagricultural sites although it is not currently labeled for these uses. In November 2001, the Company submitted a label for the original product for ground and aerial application to control undesirable vegetation in nonagricultural sites. This registration was intended to register a glyphosate product that corresponds to the product being used in Colombia. In February 2002 the product name was changed and the maximum application rate was reduced as per the request of the registrant.

#### **V HAZARD IDENTIFICATION**

Hazard identification is the first step in the risk assessment process. The objective is to qualitatively characterize the inherent toxicity of a chemical. Scientific data are evaluated to establish a causal relationship between the occurrence of adverse health effects and exposure to a chemical. Because high quality controlled toxicology studies on humans are frequently unavailable, regulatory scientists rely on animal data to estimate hazard to support regulatory decision making. Prior to and subsequent to initial registration, the Agency has required the registrants of glyphosate products to submit appropriate studies according to contemporary study requirements and testing protocol requirements.

##### **Glyphosate**

The available hazard data base on experimental animals indicates that glyphosate has low acute toxicity via the oral and dermal routes with LD<sub>50</sub>s > 5000 mg/kg. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2-generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which



resulted in evidence of appreciable parental toxicity. Glyphosate was not mutagenic in a full battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a "Group E" chemical (no evidence of carcinogenicity to humans).

#### Components of the Glyphosate Product

**1. Polyoxyethylene alkylamine (POEA).** POEA is a compound that is used as a surfactant with many glyphosate formulations. In a safety evaluation and risk assessment of glyphosate, the Roundup formulation and the surfactant POEA, Williams *et al.* (2000) reported that POEA can cause severe skin irritation and be corrosive to the eyes. In subchronic oral studies, POEA was mainly a gastrointestinal irritant in rats at high doses (~ 100 mg/kg/day) and in dogs at lower doses (30 mg/kg/day). In a developmental toxicity study in rats, POEA did not cause any developmental effects up to 300 mg/kg/day, but did induce maternal toxicity at 100 and 300 mg/kg/day (Farmer *et al.*, 2000). The concentrated formulated Roundup product can also be strongly irritating to the eyes and slightly irritating to the skin (Williams *et al.*, 2000).

**2. (information not included as it may be entitled to confidential treatment)** are substances that are not highly toxic by oral or dermal routes and are not irritating to the skin. They may cause mild, transient eye irritation. Many (information not included as it may be entitled to confidential treatment) are known not to be sensitizers (study citation not included as it may be entitled to confidential treatment). The molecular weight of a (information not included as it may be entitled to confidential treatment) determines its biological properties, and, thus, its toxicity. The lower molecular weight (information not included as it may be entitled to confidential treatment) tend to be more toxic than the higher-weighted (information not included as it may be entitled to confidential treatment) and are absorbed by the digestive tract and excreted in the urine and feces, while the higher molecular weight (information not included as it may be entitled to confidential treatment) are absorbed more slowly or not at all (study citation not included as it may be entitled to confidential treatment). (information not included as it may be entitled to confidential treatment) have low acute and chronic toxicity in animal studies. No significant adverse effects have been noted in inhalation toxicology studies, carcinogen testing, or mutagen assays. High oral doses have resulted in toxic effects to the kidneys and loose feces (study citation not included as it may be entitled to confidential treatment). Topical dermal application of (information not included as it may be entitled to confidential treatment) to burn patients with injured skin has resulted in toxicity (study citation not included as it may be entitled to confidential treatment).

#### Cosmo - Flux 411F (Adjuvant)

The Cosmo-Flux 411F adjuvant product used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Agency is not in possession of toxicity data from direct dosing of test animals with Cosmo-Flux 411F. However, the Agency has made a hazard assessment based on the toxicity of the individual components. As stated above, sale or use of spray adjuvant products in the U.S. are generally not regulated by EPA. However, the DoS has provided the EPA with a copy of this product's label and a description of the product ingredients. To be able to provide an opinion on hazard characterization of the Cosmo-flux ingredients, the EPA relied on available technical information from various sources. Cosmo-Flux 411F consists mainly of (information not included as it may be entitled to confidential treatment) with a nonionic surfactant blend primarily composed of (information not included as it may be entitled to confidential treatment). All ingredients of this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. All components of the adjuvant have been approved for use in/on food by EPA (40 CFR 180.1001, Letter from R.Forrest/EPA, to R.Woolfolk/DoS, 7/30/2001).

#### Components of Cosmflux

**1. (information not included as it may be entitled to confidential treatment).** The (information not included as it may be entitled to confidential treatment) can cause dermal and ocular irritation and, in high doses orally, can cause significant toxicity. However, small amounts are not a concern and these substances have been approved as food additives by the FDA and are exempt from tolerances by EPA on certain commodities.

**2. (information not included as it may be entitled to confidential treatment).** The other major component of Cosmo-Flux 411F, (information not included as it may be entitled to confidential treatment), is not considered highly toxic. It may cause mild eye and skin irritation. The corresponding (information not included as it may be entitled to confidential treatment), has low subacute, subchronic and chronic oral toxicity and is used as a direct food additive and a component in cosmetics. The higher molecular weight (information not included as it may be entitled to confidential treatment) is less likely to be absorbed orally or dermally and most likely of less toxicological concern. The other minor components, are not known to be highly toxic compounds and would not be of toxicological concern at the concentrations and conditions in which they are used.

#### VI DOSE RESPONSE ASSESSMENT

Dose response analysis is the second step in the risk assessment process i.e.; characterization of the quantitative relationship between exposure (dose) and response based on studies in which adverse health effects have been observed. The objective is to identify endpoints of concern which correspond to the route and duration of exposure based on the exposure patterns.

HED selects doses and endpoints (effects of concern) for risk assessment via an internal peer review process. HED uses a standing Committee - the Hazard Identification Assessment Review Committee (HIARC), to consider the available hazard data (studies required to be submitted by registrants in 40 CFR part 158 and open peer reviewed literature) to identify endpoints for use in risk assessment.

Ideally, each safety study identifies a dose level that does not produce a biologically or statistically significant increased incidence of an adverse effect or no observable adverse effect level (NOAEL). The threshold dose is the smallest dose required to produce a detectable effect. Below this dose, there is no detectable response.

#### Glyphosate

On **March 26, 1998 and, again, on November 20, 2001** the HED HIARC met to examine the hazard data base and identify dietary endpoints for Females 13-50 years old, as well as the General Population, the chronic reference dose. The HIARC also considered toxicological endpoints for incidental oral exposure (on 20-NOV-01) appropriate in residential exposure risk assessments.

The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary and residential/occupational exposures (W. Dykstra, 01/22/02; TXR# 0050428). OPP calculates acute (24 hour or single day) and chronic (continuous lifetime exposure) RfDs for the purposes of calculating dietary risk for food and drinking water. The RfD is calculated by dividing the appropriate no observed adverse effect level by a ten fold factor for interspecies variability ("average" human sensitivities might be up to 10 times that of lab animals) and a ten fold factor for intraspecies variability (i.e., some individuals within a population might be 10 times more sensitive than the "average" person).

For glyphosate, no endpoints were selected for the acute RfD since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no specific concerns for toxic effects on the developing fetus or infants and children. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term- 1 to30 days, intermediate term- 1 to 6 months, or long term- 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate (TXR No. 0050428, W. Dykstra, 22-JAN-2002). The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. A summary of doses and toxicological endpoints selected for various relevant exposure scenarios are summarized in Table 1.

**Table 1. Glyphosate Endpoint Selection Table**

| EXPOSURE SCENARIO   | DOSE (mg/kg/day)   | ENDPOINT   | STUDY                          |
|---|--|--|--------------------------------|
| Acute Dietary (24 hour or single exposure)                              | An effect of concern attributable to a single dose was not identified from the oral toxicity studies; there are no concerns for developmental or reproductive toxicity.  |  |                                |
| Chronic Dietary (continuous lifetime exposure)                          | NOAEL = 175<br>uncertainty factor (UF) = 100   | Maternal toxicity based on clinical signs (diarrhea and nasal discharge)resulting in mortality of some dams at 350 mg/kg/day | Developmental toxicity -Rabbit |
|   |  | <b>Chronic RfD = 2.0 mg/kg/day</b>   |                                |
| Incidental Oral, Short- (1-30 days), and Intermediate-(1-6 months) Term | NOAEL= 175   | Maternal toxicity based on clinical signs (diarrhea and nasal discharge)resulting in mortality of some dams at 350 mg/kg/day | Developmental toxicity -Rabbit |
| Dermal, Short-, Intermediate- and Long-Term                             | No hazard was identified, therefore quantification of dermal risk is not required. No systemic toxicity was seen at the Limit Dose (1000 mg/kg/day) following repeated dermal applications to New Zealand White rabbits. |  |                                |

|  |  |
|--|--|
| Inhalation, Short-, Intermediate-, and Long-Term | Quantification of inhalation risk is not required because 1) no hazard was identified in the 28 day inhalation toxicity study in rats - NOAEL = 0.36 mg/L (highest dose tested (HDT)); lowest observable adverse effect level (LOAEL) not established based on 6 hours/day, 5 days/week for 4 weeks and 2) due to the physical characteristics of the technical (wetcake), exposure to high levels of the active ingredient is unlikely via the inhalation route, so there was no purpose to test at higher doses. |
|--|--|

#### **Glyphosate Food Quality Protection Act (FQPA) Considerations**

On August 3, 1996 the FQPA amended FIFRA and FFDC. Section 408(b)(2)(C) of the Federal Food, Drug, and Cosmetic Act addresses exposure of infants and children. Under this provision EPA must apply the default 10X safety factor when establishing, modifying, leaving in effect or revoking a tolerance or exemption for a pesticide chemical residue, unless the EPA concludes, based on reliable data, that a different safety factor would protect the safety of infants and children. Risk assessors, therefore presume that the default 10X safety factor applies and should only recommend a different factor, based on an individualized assessment, when reliable data shows that such different factor is safe for infants and children that it does not rely on a default value or presumption in making decisions under Section 408 where reliable data are available that support an individualized determination. The OPP FQPA Safety Factor Committee (SFC) makes specific case-by-case determinations as to the need and size of the additional factor if reliable data permit. Determination of the magnitude of the overall safety factor or margin of safety involves evaluating the completeness of the toxicology and exposure databases and the potential for pre- or post-natal toxicity. Individualized assessments may result in the use of additional factors greater or less than, or equal to 10X, or no additional factor at all. (*OPP Guidance Document on Determination of the Appropriate FQPA Safety Factor(s) in Tolerance Assessment, 2002*)

The HIARC addressed the potential enhanced sensitivity of infants and children from exposure to glyphosate as required by the FQPA of 1996 at the March 26, 1998 meeting and reaffirmed the decision at the November 20, 2001 meeting. The HIARC concluded the following:

- Based on the available data, there was no evidence of quantitative and qualitative increased susceptibility to *in utero* and/or postnatal exposure to glyphosate in rats or rabbits.
- Based on a weight of evidence consideration, the HIARC decided **not** to require the conduct of a developmental neurotoxicity study with glyphosate to evaluate the potential for developmental neurotoxic effects because there was no evidence of neurotoxicity and neuropathology in adult animals.

The **FQPA SFC met on April 6, 1998** to evaluate the hazard and exposure data for glyphosate. The FQPA SFC concluded that the safety factor of 10x be removed (reduced to 1x) since there is no evidence of quantitative or qualitative increased susceptibility of the young demonstrated in the prenatal developmental studies in rats and rabbits and pre/post natal reproduction study in rats. In addition the toxicology data base is complete, a developmental neurotoxicity study is **not** required, and the dietary (food and drinking water) exposure assessments will not underestimate the potential exposures for infants and children.

#### **VII EXPOSURE ASSESSMENT**

The exposure assessment is the third step in the risk assessment process. The objective is to determine the source, type, frequency, magnitude, and duration of actual or hypothetical contact by humans with the agent of interest. To conduct this assessment EPA relied upon the information provided by DoS from two sources: (1) Department of State (DoS) Presentation, DoS Coca Eradication Program, 4/18/02, (2) DoS document entitled Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application. These data were used in accordance with standard policies and procedures used by the Agency in conducting pesticide exposure assessments.

#### **Dietary Food Exposure**

Acute dietary exposure is possible for persons consuming livestock or food crops which have been inadvertently sprayed as a result of the aerial eradication program in Colombia. However, since glyphosate is a contact herbicide that systemically kills plants after absorption through leaves, dietary exposure due to consumption of treated crops is expected to be limited. Since a coca field is sprayed no more than twice to eradicate the crop, no chronic food exposure is expected. Based on an evaluation of the hazard database, the Agency did not identify a toxic effect attributed to a single oral dose. Therefore, an acute dietary risk assessment was not performed (TXR No. 0050428, W. Dykstra, 22-JAN-2002). No significant risk due to dietary exposure to glyphosate residues is expected.

## Occupational Handler and Post-application Exposure

### Use Pattern Information

The tank mixture sprayed for eradication of coca in Colombia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). No more than two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons/Acre (equivalent to 1.1 gallons/Acre of glyphosate product, 0.03 gal/Acre of Cosmo-Flux 411F, and 0.12 gal/Acre of water). DoS also stated that the average field size for coca in Colombia is 3-5 hectares (approximately 7-12 acres). The program for aerial eradication of coca treats a maximum of 1000 Acres/day, during 3-5 missions/day.

### Handler Exposure

Exposure is expected for workers mixing and loading the glyphosate formulated product and tank mix, and applicators applying the pesticidal mixture via fixed-wing aircraft. Mixers, loaders, and applicators (handlers) have the potential for dermal exposure to the concentrate glyphosate formulated product or tank mix from droplets contacting the skin. There is also the potential for inhalation exposure to the concentrated glyphosate formulated product or mixed formulation from breathing in aerosolized spray droplets.

According to the DoS, the mixer/loaders are trained on the label requirements for handling the chemicals in the spray mixture, first aid, and use of personal protective equipment (PPE). The required PPE according to the label includes long-sleeved shirts and long pants, waterproof gloves, shoes and socks, and protective eyewear. PPE is expected to mitigate potential exposure to handlers. Exposure to handlers is anticipated for short-term (1-30 days) durations. There also may be the possibility for intermediate-term (1-6 months) handler exposure for individuals mixing, loading, and applying the glyphosate mixture to multiple fields for more than 30 days. However, the Agency does not have information pertaining to the duration of coca spray programs or number of days spent mixing, loading, and applying the glyphosate mixture.

An occupational handler exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (i.e., mixers, loaders, applicators, etc.) during use. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for dermal or inhalation short- and intermediate-term exposures. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002). No significant handler risk is expected.

### Post-application Exposure

According to the DoS, Colombian coca plants (*Erythroxylum* species) are woody perennial shrubs native to the Andean region. Coca plants have leaves with waxy cuticles which retard herbicide uptake in the plant. The coca bushes grow to approximately chest level and are harvested mainly by leaf pulling, 4 to 5 times per year. Coca plants grow from seedlings to a harvestable plant in 12 to 18 months. Representatives from DoS indicated that, growers will prune the coca plants, immediately after spraying, in order to salvage the coca crop. Specifically, since glyphosate is a contact herbicide that works systemically to kill the plant after absorption through the leaves, workers may enter fields immediately after spraying in order to prune or pull off the coca leaves in order to prevent the coca plant from dying. In the US, most uses of glyphosate are applied to kill weeds - which are the target. In general, glyphosate is not applied in the US to destroy or kill the raw agricultural commodity. The intended US uses are for undesired vegetation in and around crop fields, forests, industrial areas and residential areas (for more detailed information, please refer to the June 28, 2002 memorandum entitled *Description of Glyphosate Use in the U.S. for Comparison to Use in Colombia for Coca Eradication from Virginia Werling and Timothy Kiely to Jay Ellenberger*).

DoS states that pilots are instructed not to spray fields where people are present. Therefore, based on the use pattern described by the DoS, potential short-term dermal exposures are expected for persons pruning, or leaf pulling treated coca plants immediately after spray events. These activities are expected to result in dermal exposure from treated foliage contacting the skin. In cases such as glyphosate, where the vapor pressure is negligible, HED experience with post-application data suggests that inhalation exposure is minimal and therefore, HED does not quantitatively assess post-application inhalation exposure. Intermediate- and long-term post-application exposures are not expected due in part to the fact that a coca field is sprayed no more than twice.

Additionally, glyphosate is a translocated herbicide which is rainfast (unable to be rinsed off by water) within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal. Glyphosate has no residual soil activity. Results from the first 12 months of bareground field dissipation trials from eight sites show that the median half-life (DT50) for glyphosate (Roundup) applied at maximum annual use rates (7.95 lb a.i./acre, 10.7 lb a.i./acre) was 13.9 days with a range of 2.6 (Texas) to

140.6 (lowa) days. Acceptable aerobic soil, aerobic aquatic and anaerobic aquatic metabolism studies demonstrate that under those conditions at 25°C in the laboratory glyphosate degrades rapidly with half-lives of approximately 2, 7 and 8 days respectively. The reported half-lives (DT50) from the field studies conducted in the coldest climates, i.e. Minnesota, New York, and Iowa, were the longest at 28.7, 127.8, and 140.6 days respectively indicating that glyphosate residues in the field are somewhat more persistent in cooler climates as opposed to milder ones (Georgia, California, Arizona, Ohio, and Texas) (Memo, J.Carleton, 10/26/98, D238931). The climate in Colombia would favor a shorter half life than the colder regions of the US. Thereby, HED believes glyphosate would not be persistent or be available for intermediate-term or long-term post-application exposures in the Colombian climate.

A post-application exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for these durations or routes of exposure. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002). No significant post-application risk due to glyphosate exposure is expected as a result of this use.

#### **Incidental Oral Exposure (Hand-to-Mouth)**

Since DoS states that pilots are instructed not to spray fields where people are present, incidental oral exposure (hand-to-mouth) resulting from being directly sprayed by glyphosate was not assessed. Non-dietary incidental oral exposure was not quantitatively assessed for the use of glyphosate in Colombia.

As a point of comparison, screening level risk estimates for toddler incidental oral exposures (hand-to-mouth) to the U.S. for registered residential turf uses of glyphosate have been calculated (D280831, Memo, W.Donovan, 20-FEB-2002). All resulting risks for toddler incidental oral exposure do not exceed HED's level of concern. The assumptions for toddler incidental oral exposures, (based on the maximum application rate of 1.62 lbs acid equivalent (ae)/Acre), are expected to be conservative. For example, it is assumed that there is no dissipation of transferable residues, so that toddlers are exposed to day of treatment residues for each day of exposure. Even though the application rate for the coca eradication program is higher (3.3 lbs ae/Acre), using the same standard screening level assumptions as used in the residential assessment for the U.S. registered turf use and taking the higher application rate into account, the potential risk would not exceed HED's level of concern.

As indicated in the turf assessment, glyphosate was directly applied to residential lawns and did not result in exposures of concern to HED. Although spray drift is always a potential source of exposure to residents nearby aerial spraying operations, AgDrift (a spray drift model) consistently predicts drift from applications is only a fraction of the applied rate (lb ai/acre). Based on this assessment, HED believes that it is unlikely that there is a higher potential for risk of exposure to spray drift from agricultural operations.

#### **Eye Exposure**

The greatest potential for eye exposure is expected for workers mixing and loading the concentrated glyphosate product. Potential exposure is expected through 2 main pathways: (1) exposed hands transferring the glyphosate product to the eye(s), (2) splashing of the liquid concentrated glyphosate product into the workers' eye(s). However, the label requires mixer/loaders to wear protective eyewear and this level of PPE is expected to mitigate the potential for eye exposure.

There is also the potential for eye exposure as a result of entering treated fields immediately after treatment to perform pruning or harvesting activities. Specifically, persons dermally contacting treated foliage may transfer residues from the hand to the eye. However, the Agency currently does not have a defined method or model to assess quantitative eye exposures resulting from occupational or residential exposures to pesticides. For products registered for use in the United States which have high acute toxicity to the eye, mitigation of exposure to potential eye effects for post-application workers is done by lengthening restricted entry intervals (REI).

#### **VIII SPRAY DRIFT**

Due to spray drift, there is potential exposure for persons in areas near those targeted for spraying. Exposure through drift is not expected to exceed that which is identified in the exposure characterization provided above. The coca eradication program described by the Department of State has incorporated several features designed to minimize the potential for off-target drift, provide quality assurance on a mission-by-mission basis, and evaluate the performance of the program to the extent possible given current conditions. Three types of aircraft are used in the program including the Ayres Corporation T65 Thrush, modified OV10D Bronco aircraft converted from military observation use to spray aircraft, and the Air Tractor AT802. The T65 and AT802 are common to the agricultural sector in the United States. The nozzles are Accu-Flow as described at the April 18, 2002 briefing to the Agency. The droplet spectra characteristics, under use conditions for these nozzles, produce a very large

droplet which has a volume median diameter (VMD) between 300 and 1500 microns. Use of droplets this size is consistent with minimizing spray drift in agriculture in the United States. A surfactant (Cosmo-Flux 411F) is also used in the spray solution along with water and the glyphosate formulated product. The use of spray adjuvants (in this case Cosmo-Flux 411F) in pesticide product formulations and/or the spray solution is also consistent with common agricultural practices in the United States.

The quality assurance standard operating procedures identified as incorporated into the program are also consistent with standard agricultural practices. These include reconnaissance of the spray sites, use of global positioning satellite technology (GPS), and criteria for aborting missions (e.g., based on climatological conditions or presence of persons or livestock in the treatment areas). Reconnaissance of spray sites is intended to define the treatment zones through the use of sophisticated GPS mapping which is then overlaid with GPS spray records from missions to evaluate performance. GPS technology is used for planning, assessments of mission performance, and for archival purposes to evaluate potential claims against the program.

Finally, to a limited extent where feasible, DoS reports that on-site ground inspections for spray efficacy and potential adverse effects are performed. Reports suggest approximately 90 percent efficacy in the spray swath and minimal collateral damage to surrounding vegetation (e.g., aerial photos of treated areas) based on information supplied by the DoS at the April 18, 2002 briefing.

The Agency did not complete a quantitative risk analysis of the drift potential of glyphosate in the water/surfactant solution used in this program. However, the technology and other safeguards used in this program are consistent with common approaches in the United States for reducing spray drift. Therefore, it is likely that drift is minimized in this program if all procedures are adhered to and operational equipment is in working order. At the April 2002 briefing, it was indicated to the Agency that quantitative spray drift studies had been completed by the DoS in conjunction with the University of Georgia. These were not supplied to the Agency nor were they considered in this evaluation. Additionally, it should be noted that the Agency did not review the primary source of information provided (e.g., the method by which the VMD was determined was not described, written application protocols describing target site conditions when applications would be aborted were not provided, and methods for scoring or measuring off-target damage were not provided).

#### **IX INCIDENT DATA REVIEW: A STUDY OF HEALTH COMPLAINTS RELATED TO AERIAL ERADICATION OF POPPY IN COLOMBIA**

Dr. Jerry Blondell is a health statistician and the point of contact for human incident data in the EPA Pesticide Program. He has reviewed the poppy incident data from Colombia and compared these data to the glyphosate incident data reported from California and the Poison Control Center. The entire review can be found beginning on page 38 of this document.

The report, prepared by the Department of Narino, Municipality of El Tablon De Gomez, makes a concerted effort to identify any health problems that might be related to use of the glyphosate tank mix in aerial eradication programs. The study was commissioned by the U.S. Embassy in Bogota and conducted independently by Dr. Camilo Uribe, Director of Clinica Uribe Cualla, the national poison control center. Sections of this report are summarized below with the sections numbered in **bold** corresponding to the original report.

An exact comparison of the epidemiological data in Colombia (which is from aerial application to poppy) relative to the conditions of use, presented at the April 18, 2002 briefing (for aerial application to coca) by DoS to OPP risk assessors, would have limitations and uncertainties. The briefing did not address the conditions of use for poppy. DoS also did not provide human incident data for the coca eradication program. Subsequent to the April 18 briefing HED received an e-mail communication from OPP/ Field and External Affairs Division, stating that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy also differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

##### **1.1 Description of studied area**

This report primarily concerns the area around the municipality of El Tablon in southern Colombia. The total population is given as 16,770, of which 89% is categorized as rural. The main crops in this area include coffee, corn, wheat, oats, potatoes, and illicit opium poppy. It is known that a variety of other pesticides, more toxic than glyphosate, are used on these crops. The municipality has three health centers, including Aponte, which is the focus of this report. The Aponte health center is staffed by a medical doctor, a nurse, and a nurse's aide. Aerial eradication of the illicit opium poppy reportedly occurred in this region in June, July, and November of

2000.

**1.2 Morbidity and mortality in the municipality of El Tablon**

The Narino Departmental Health Institute provided summary morbidity and mortality information for the El Tablon De Gomez area and the Aponte settlement for the year 1999. Data for the year 2000 had not yet been officially released, but estimates are provided. These data are reported here to provide an approximate description of glyphosate tank mix exposure upon use on coca fields in Colombia. However, no quantitative conclusions can be drawn from these data. Six illnesses likely to be related to pesticide exposure were identified and tabulated. They include, acute diarrhea, acute respiratory infection, dermatitis, intoxication, conjunctivitis and headache. The authors note that the first three illnesses listed (diarrhea, respiratory infection, and dermatitis) are likely to be related to problems with inadequate nutrition, housing, and lack of health services. The basis for this listing of symptoms is not specified, but it does agree with the list of symptoms likely to result from exposure to glyphosate products based on Poison Control Center data, California surveillance reports, and the world literature. Total morbidity for 1999 and estimated morbidity for 2000 are given in the Table below for El Tablon De Gomez and the Aponte Settlement below. Note, however, that the overwhelming majority of these illnesses did not occur at the time of spraying and, therefore, could not be related to spray exposure.

**Table 2. Morbidity reported in the El Tablon De Gomez of Colombia in 1999 and estimated for 2000.**

| Pathology                       | 1999  | 2000 Estimated |
|---------------------------------|-------|----------------|
| Acute diarrhea                  | 146   | 186            |
| Acute respiratory infection     | 568   | 506            |
| Dermatitis                      | 209   | 265            |
| Poisoning/Intoxication          | 1     | 4              |
| Conjunctivitis                  | 75    | 85             |
| Headaches                       | 139   | 151            |
| Total for 6 suspected illnesses | 1,138 | 1,197          |

**Table 3. Morbidity reported in the Aponte Settlement of Colombia in 1999 and estimated for 2000.**

| Pathology                       | 1999 | 2000 Estimated |
|---------------------------------|------|----------------|
| Acute diarrhea                  | 181  | 190            |
| Acute respiratory infection     | 199  | 222            |
| Dermatitis                      | 210  | 180            |
| Poisoning/Intoxication          | 4    | 4              |
| Conjunctivitis                  | 87   | 104            |
| Headaches                       | 78   | 95             |
| Total for 6 suspected illnesses | 759  | 795            |

The Aponte settlement is contained within the El Tablon De Gomez area, where there has been a concern for

herbicide spraying-related health effects. Figures in the report are listed by five separate age groups. This reveals that the majority of the cases of diarrhea and respiratory infection occurred in children less than five years old, as would be expected given known demographics of those health effects. Nationwide data show that 53% of intoxications are suicides or suicide attempts, but it is not clear how many of the four poisonings listed above might be suicidal or, more importantly, are due to other products such as medications. In both Tables 2 and 3 there is an increase of 5% from 1999 to the estimate for 2000 for the total of the six suspected illnesses. Given that spraying is reported to have occurred in 2000 and not 1999, this suggests that the overwhelming majority (95%) of illnesses reported would be background incidence unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the glyphosate tank mixture was responsible for these complaints.

### 1.3 Epidemiological monitoring system and mandatory notification

In addition to the summary of general morbidity in the population, there is a mandatory health reporting system in Colombia for 34 illnesses including pesticide poisonings. The review of these records found no reports of pesticide poisoning for the municipality of El Tablon in the year 2000 or the first 9 weeks of 2001. Weekly reports were examined to determine how many pesticide poisonings were reported each month. It did not appear that the times of spraying correlated with reports of pesticide intoxication.

**Table 4: Reports of Pesticide Intoxication provided to the Narino Department of Health Institute, Epidemiology Section January 12, 2000 through March 7, 2001.**

| Month/Year    | Number of Poisonings | Month/Year     | Number of poisonings | Poisonings occurring at time of spraying |
|---------------|----------------------|----------------|----------------------|--|
| January 2000  | 0                    | July 2000      | 11                   | 9  |
| February 2000 | 0                    | August 2000    | 6                    |  |
| March 2000    | 8                    | September 2000 | 12                   |  |
| April 2000    | 13                   | October 2000   | 8                    |  |
| May 2000      | 7                    | November 2000  | 13                   | 6  |
| June 2000     | 15                   | December 2000  | 2                    |  |
| --            | -                    | Jan. 2001      | 7                    |  |
| --            | -                    | Feb. 2001      | 19                   |  |
| --            | -                    | Mar. 2001      | 0                    |  |

Out of a total of 125 reported pesticide poisonings in 61 weeks, 15 occurred during 5 weeks when spraying eradication occurred. Given the variation in the data, this could easily be due to chance and be unrelated to exposure from the spraying of the glyphosate tank mixture. More work is required to determine whether locations of the 15 suspect poisonings matched the location and timing of spraying.

In 2000, the Narino Department of Health requested all municipalities to report the human health effects of pesticide spraying. Ten municipalities supplied the reports. They are:

Three municipalities including Tablon de Gomez, Barbacoas, and Magui reported no cases. However, the reports were completed prior to the November spraying in Barbacoas and Magui and prior to (or perhaps during) the July and before the November spraying in Tablon de Gomez. Buesaco reported one patient with sore throat, numbness in limbs, and conjunctivitis in June. In Tumaco, six cases of patients with conjunctivitis and dermatitis were reported as of October 6, 2000. In San Pablo, 50 cases of dermatitis, conjunctivitis, respiratory conditions, and digestive problems were reported after as of October 6, 2000.

In La Cruz, two cases of allergic rhinitis, two cases of dermatitis, and five cases of conjunctivitis were reported



as of October 6, 2000. San Jose de Alban did not report any specific cases, but the scientific coordinator and chief nurse noted an increase in gastrointestinal, dermatological and respiratory conditions. The exact quantity of these conditions in relation to spray times was not given. El Rosario reported five cases of conjunctivitis and rhinitis that might have been related to spraying carried out on July 31. San Pedro de Cartago reported an increase in gastrointestinal symptoms but no quantitative relationship between illnesses and spray times was provided.

The absence of any reports of pesticide poisoning combined with the information from the ten municipalities is difficult to interpret. The glyphosate formulated product is known to cause irritation to the skin, eyes, mucous membranes which may account for some of the reports of sore throat, conjunctivitis, dermatitis and other conditions described above. However, it is not possible to evaluate these reports in any detail due to the lack of any information on how many of these cases experienced exposure immediately prior to their illness and lack of information on investigation of potential alternative causes. This anecdotal information does not provide any substantial evidence of health effects due to the spraying of the glyphosate tank mixture in Colombia. Many of the reports are consistent with exposure to glyphosate products by the dermal route, as reported in California and the literature. So, it is possible that some cases could be related to the aerial eradication program.

To provide context for comparison, the California Pesticide Illness Surveillance Program (1982-2000) data for glyphosate were reviewed for this risk assessment. Starting in 1992, the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that the reformulated glyphosate product used since 1992, have resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to the reduction in eye injuries.

## **2.2 Review of report of January 22, 2001 visit to the municipality of El Tablon de Gomez.**

A commission visited the municipality of El Tablon on January 22, 2001 and spoke with Dr. Tordecilla and reviewed health records of his patients. A number of records of skin conditions were noted for the months of October, December 2000, and January 2001. The exact number of cases, selection criteria, and method of analysis was not specified in the summary report. Nevertheless, the commission concluded "that the information available permitted the commission to consider only the possibility of an association between exposure to pesticides and the effects". The commission noted that it lacked the technical expertise, the data on dates and locations of spraying, and therefore could not conclude whether the observed conditions were related to pesticide exposure.

## **2.3 Interviews with Narino department health officials regarding the spraying**

Employees of the Narino Department Health Institute were interviewed by Colombian authorities. A Fatima Health Promoter thought children were most affected, suffering gastrointestinal problems and eye irritation. One possible route of exposure was the village water fountains which supply some of the drinking water. The most common symptoms in children, according to the Health Promoter, were stomach aches and vomiting, which were different from the most common symptoms of glyphosate exposure reported by Lee et al. (2000), sore throat and nausea. This inconsistency suggests that some cause other than glyphosate products was responsible for the children's complaints. The Health Promoter reported one case of a boy with skin lesions like sores after the spraying. The Health Promoter was particularly concerned that peasants receive more health care from the government.

A nurse's aide reported that three or four patients with burning eyes, headache, and dizziness were seen at her health center. One boy with a respiratory infection was sent to another health center, later died. Medical records were sought to substantiate this report but there was no clinical history, autopsy or other information to support glyphosate spraying as a factor. She referred a patient with urinary problems to the hospital. Subsequent review of the medical records of this case did not find reference to glyphosate tank mix exposure and suggested an infectious origin. There were also cases of dermatitis, headache, abdominal pain and gastrointestinal symptoms, but she could not say whether the symptoms were related to exposure to the spraying of glyphosate tank mixture.

Another nurse's aide reported by telephone that her impression was that the number of dermatological consultations had increased. However, there was no clear association with glyphosate tank mix exposure and many of the reasons for the consultations were the same as in previous years when glyphosate was not used, so no clear relationship between the spraying and these dermatological conditions was identified.

Reports of anecdotal evidence by nurse's aides and the health promoter have not established a link between the spraying of glyphosate tank mix and health effects. Follow-up to determine the timing and evidence of exposure and examination of other potential causes of these effects was not performed. These interviews do not add significant evidence about the health risks from the use of glyphosate tank mixture in Colombia.

## 2.5 Review of records of patients treated at Aponte Health Center - Sept. 2000 to Jan. 2001

There were 29 cases reported by Dr. Tordecelli and clinical records were obtained for 21 of them. Two other reports of skin lesions were sought but could not be confirmed. After careful review of the 21 records, it was determined that all but four cases were likely due to other causes. Most had skin conditions known to be related to bacteria or parasites, not chemical exposures and the onset of their symptoms did not correspond with the times of spraying. There were seven patients whose symptoms started after spraying and three of these were conditions known to be caused by bacteria or parasites. For the remaining four cases possibly related to the spraying of glyphosate tank mixture, one was an allergic reaction that had been seen in this patient before when there was no spraying. A second and third case were contact eczema that is endemic in this region and thought to be more likely due to an infectious origin. One of these two cases did not initiate until 52 days after the last spraying. The fourth case was dermatitis on the thigh which would typically be protected by clothing and thereby protected from aerial spray applications. This reviewer agrees with the conclusion that "the twenty-one clinical histories . . . reveals that any relationship between aerial eradication with the herbicide glyphosate (tank mixture) and the skin conditions treated in Aponte is unlikely".

In summary, the evidence collected and presented in this report cannot confirm that the glyphosate tank mixture used in Colombia as the likely cause of illness in the surrounding community. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, and respiratory passages and suggest that the Cosmo-Flux 411F added to the glyphosate product in Colombia has little or no effect on the overall toxicity of the formulated product.

Rather than review incomplete medical records, it would be better to collect information prospectively. For example, if pesticide poisoning is a mandatory reporting condition, a form documenting the exposure, health effects and medical data on each case could be designed and used to establish whether any particular conditions might be related to spraying the glyphosate tank mixture. Without prospective collection of data and follow up, it is difficult to evaluate potential health effects of the glyphosate tank mixture sprayed in Colombia. Better records of the time of exposure relative to the onset of symptoms would also enhance interpretation of the incidence data.

## X RISK CHARACTERIZATION

Risk characterization combines the assessments of the first three steps to develop a qualitative or quantitative estimate of the probability, that under the assumed conditions or variables of the exposure scenario, that harm will result to an exposed individual. Risk is equal to hazard multiplied by exposure. For the scenarios that are relevant to the subject use, the Agency has not identified toxic effects attributable to a single oral exposure, short- or intermediate-term dermal, or short- or intermediate-term inhalation exposures (TXR No. 0050428, W. Dykstra, 22-JAN-2002). Therefore, no quantification of exposure or risk was performed. Nonetheless, it is appropriate to qualitatively characterize the potential for risk concerns for this use.

From the review of glyphosate product incident reports for the use on poppy, it should be emphasized that the spraying reported to have occurred in 2000 and not in 1999 suggests, that the overwhelming majority (95%) of the illnesses reported would be background incidents unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incident data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There is some data to suggest that the poppy eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on the use, timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. The evidence collected and presented in the epidemiology report cannot confirm that the glyphosate tank mixture used in Colombia as the likely cause of a single illness. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, and respiratory passages and suggest that the Cosmo-Flux 411F added to the glyphosate product in Colombia has little or no effect on the overall toxicity of the formulated product. The

information so far collected indicates that any increase in health problems is likely to be relatively small at most and the severity of those symptoms is likely to be minor to moderate at most. The Amazon Alliance and Earth Justice submission provided little, if any, information on the number of persons affected, age and sex, symptoms of illness, or diagnosis or treatment received. Without such information EPA cannot even begin to characterize the extent and pattern of the health effects claimed to result from glyphosate application. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

The *glyphosate formulated product* used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* is classified as category III for primary eye irritation and category IV for acute dermal and oral toxicity, and skin irritation. It not a dermal sensitizer. However, the surfactant used in the *formulated* product reportedly can cause severe skin irritation and be corrosive to the eyes, as would be expected for many surfactants. The label for the *formulated* product used in the coca eradication program in Colombia includes the "Danger" signal word. The product has been determined to be toxicity category I for eye irritation, causing irreversible eye damage. Some of the findings reported in the incident data are in alignment with that, reports of toxicity to the eye due to the surfactant, not glyphosate *per se*. This is supported by data obtained from the California Pesticide Illness Surveillance Program (1982-2000). As stated previously, in 1992 the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that the use of the reformulated glyphosate product since 1992, has resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to the reduction in eye injuries.

The acute toxicity of the undiluted glyphosate product is most pertinent to mixers and loaders, who are potentially exposed to that form of the glyphosate product. On April 18, 2002, during a consultation with the DoS, in preparation for the current risk assessment, the DoS agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix. To date, the Pesticide Program has not received this data. Until such information is supplied to the Agency, EPA cannot evaluate any potential acute toxicity effects resulting from direct contact with the tank mixture. Therefore, due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that an alternative glyphosate product (with lower potential for acute toxicity) be used in future coca and/or poppy aerial eradication programs.

A direct comparison of the epidemiological data in Colombia (which is from aerial application to poppy) to the conditions of use, (as presented at the April 18, 2002 briefing for aerial application to coca by DoS to OPP risk assessors), would be limited. The briefing did not address the conditions of use for poppy. Subsequent to the April 18 briefing HED received an e-mail communication from OPP/ Field and External Affairs Division, stating that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. The Agency also has questions as to the geographical area differences, the frequency of repeated applications, and the size of the area treated on each spray mission. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

In summary, HED concludes that:

- There are no risks of concern for glyphosate, *per se*, from the dermal or inhalation routes of exposure, since toxicity is very low.
- The identified components of the adjuvant Cosmoflux 411F are not highly toxic by the oral and dermal routes; they have been approved for use in/on food by the Agency.
- Glyphosate is not highly toxic. Based on the conditions of glyphosate use described by DoS, there is likely minimal exposure or concern for acute and chronic dietary or incidental oral risks.
- The incident data from Colombia based on the poppy use may differ from use of glyphosate as part of the coca eradication program, so conclusions should be made with caution.

- There is concern for acute eye toxicity because of an inert ingredient present in the glyphosate formulated product used to treat coca. The potential for eye effects is primarily for mixers/loaders of the concentrated glyphosate product, which should be mitigated by protective eye wear which DoS states is being used.
- Due to the acute eye irritation caused by the concentrated glyphosate product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternate glyphosate product in future coca and/or poppy aerial eradication efforts.

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### **SECTION 3. Review of Glyphosate Incident Reports with special reference to aerial spraying in Colombia**

#### **BACKGROUND**

On May 8, 2002 the U. S. Department of State requested that the U.S. Environmental Protection Agency provide consultation on the U.S.-supported aerial coca eradication program in Colombia. Specifically, the Department of State requests advice on whether the aerial application program may pose unreasonable risks or adverse effects to humans or the environment. This review is part of a health risk assessment performed by the Health Effects Division of the glyphosate product used in Colombia. This review will focus on reports of human health effects reported from the leading pesticide poisoning surveillance data sources in the United States, which include Poison Control Centers and the California Pesticide Illness Surveillance Program. The California data source is especially useful for this review because of its ♦s high quality, documentation going back to 1982, and because glyphosate is the second most widely used pesticide in California affording ample opportunity for unintentional exposures. The world scientific literature on glyphosate and a report from Colombia examining reports of the adverse health effects are also reviewed.

The aerial spray mixture used in Colombia consists of water, glyphosate formulation, and 1 percent Cosmo-Flux 411F. According to documentation supplied by the Department of State, this diluted mixture is applied to coca at the rate of 2.53 gallons per acre (U. S. Department of State 2002). "The commercial glyphosate formulation used in the spray mixture is registered with U. S. Environmental Protection Agency (EPA) for sale in the United States for non-agricultural use and contains 41 percent glyphosate salt and 59 percent inert ingredients. Approximately three fourths of the inert ingredient content are water and the remainder is a surfactant blend. A surfactant is essentially a soap that enhances the ability of the herbicide to penetrate the waxy cuticle of the leaf surface."(U. S. Department of State 2002).

This review will not be able to fully assess the formulation containing 1 percent Cosmo-Flux 411F because that particular surfactant has not been used in the United States. Nevertheless, it will consider the summary of the investigation in Colombia of the formulation which does contain this additional surfactant. Though all aspects of glyphosate human poisoning data will be considered, this review will focus on one particular scenario, namely the effects of dermal and inhalation exposure from spray drift or residues, that result from aerial application.

The following data bases have been consulted for the poisoning incident data on the active ingredient glyphosate (PC Code: 103601):

1) Poison Control Centers - as the result of a data purchase by EPA, the Office of Pesticide Programs (OPP) received Poison Control Center data covering the years 1993 through 1998 for all pesticides. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance System which obtains data from about 65-70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc. Note that Poison Control Center data does not have information on the type of

application. So it is not possible to limit the review to the aerial application scenario or to limit it to only those persons secondarily exposed to drift or residue. However, it will be possible to exclude oral exposures which are inconsistent with the focus of the present review.

2) California Department of Pesticide Regulation - California has collected uniform data on suspected pesticide poisonings since 1982. Physicians are required, by statute, to report to their local health officer all occurrences of illness suspected of being related to exposure to pesticides. The majority of the incidents involve workers. Information on exposure (worker activity), type of illness (systemic, eye, skin, eye/skin and respiratory), likelihood of a causal relationship, and number of days off work and in the hospital are provided. The California data permits assessing the risk of exposure both to handlers and to bystanders. The exposure of bystanders and others to drift and residue will be a primary focus of this review.

3) Scientific Literature - A search was performed on Medline for scientific literature related to the human health effects of glyphosate. All articles were retrieved and reviewed for relevance. Articles involving dermal or ocular exposure are given priority because this fits with the primary scenario of concern for this review.

4) A report from the Department of Narino, Municipality of El Tablon De Gomez "A Study of Health Complaints Related to Aerial Eradication in Colombia", Final Report dated September 2001 is reviewed. This document addresses the specific exposure of interest and therefore will be given special attention.

### GLYPHOSATE REVIEW

#### I. Poison Control Center Data - 1993 through 1998

Results for the years 1993 through 1998 are presented below for occupational cases, non-occupational involving adults and older children, and for children under age six. Reports of intentional exposures (e.g., suicide attempts) and exposures to multiple products are excluded. Cases where the outcome was determined to be unrelated to the exposure were also excluded. Tables 1-4 present the hazard information for glyphosate compared with all other pesticides on six measures: percent with symptoms, percent with moderate, major (includes life-threatening or residual disability) outcome, percent with major outcome, percent of exposed cases seen in a health care facility, and percent hospitalized and percent seen in a critical care facility. There were no cases with a fatal outcome between 1993 and 1998. Table 1 reports the number of cases on which the data derived in Tables 2-4 are based. Table 2 presents this information for occupational cases, Table 3 for non-occupational cases involving adults and older children (six years or older), and Table 4 for children under age six. Note that Table 2, involving occupational exposure, is of less relevance to this review because it is inconsistent with the exposure scenario of interest in Colombia.

Table 1. Number of glyphosate exposures reported to the Toxic Exposure Surveillance System (AAPCC), number with determined outcome, number seen in a health care facility for occupational and non-occupational cases (adults and children six years and older) and for children under six years of age only, 1993-1998 .

| Subgroup                                    | Exposures | Outcome determined | Seen in Health Care Facility |
|---|-----------|--------------------|------------------------------|
| Occupational: adults and older children     | 875       | 663                | 263                          |
| Non-occupational: adults and older children | 7491      | 5177               | 940                          |
| Children under age six                      | 4897      | 3589               | 207                          |

Table 2. Comparison between glyphosate and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or residual disability (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) reported to Poison Control Centers, 1993-1998 for occupational cases only.

| Pesticide      | SYM*  | MOD*  | LIFE-TH* | HCF*  | HOSP* | ICU*  |
|----------------|-------|-------|----------|-------|-------|-------|
| Glyphosate     | 77.8% | 7.54% | 0.15%    | 30.0% | 2.28% | 0.76% |
| All Pesticides | 86.0% | 18.8% | 0.62%    | 47.0% | 6.08% | 2.36% |

|       |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|
| Ratio | 0.90 | 0.40 | 0.24 | 0.64 | 0.38 | 0.32 |
|-------|------|------|------|------|------|------|

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

Table 3. Comparison between glyphosate and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or residual disability (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) reported to Poison Control Centers, 1993-1998 for non-occupational cases involving adults and older children.

| Pesticide      | SYM*  | MOD*  | LIFE-TH* | HCF*  | HOSP* | ICU*  |
|----------------|-------|-------|----------|-------|-------|-------|
| Glyphosate     | 61.9% | 4.27% | 0.15%    | 12.5% | 2.87% | 0.85% |
| All Pesticides | 68.5% | 10.5% | 0.36%    | 16.4% | 6.24% | 2.67% |
| Ratio          | 0.90  | 0.41  | 0.43     | 0.76  | 0.46  | 0.32  |

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

Table 4. Comparison between glyphosate and all pesticides for percent cases with symptomatic outcome (SYM), moderate or more severe outcome (MOD), life-threatening or residual disability (LIFE-TH), seen in a health care facility (HCF), hospitalized (HOSP), or seen in an intensive care unit (ICU) for adults and children six years and older reported to Poison Control Centers, 1993-1998 for children under six years old.

| Pesticide      | SYM*  | MOD*  | LIFE-TH* | HCF*  | HOSP* | ICU*  |
|----------------|-------|-------|----------|-------|-------|-------|
| Glyphosate     | 23.5% | 0.45% | 0.056%   | 4.23% | 3.38% | 0.48% |
| All Pesticides | 21.8% | 1.40% | 0.12%    | 16.4% | 4.78% | 1.36% |
| Ratio          | 1.08  | 0.32  | 0.47     | 0.26  | 0.71  | 0.35  |

\* Symptomatic cases based on those cases with a minor, moderate, major, or fatal medical outcome. Denominator for SYM, MOD, and LIFE-TH is the total cases where medical outcome was determined. Denominator for HCF is all exposures. Denominator for HOSP and ICU is all cases seen in a health care facility.

Glyphosate clearly has a pattern of much lower toxicity than other pesticides. When cases with symptoms, moderate, and major medical outcome are evaluated, glyphosate not only has a lower ratio than other pesticides, but the ratio tends to decrease markedly with the more severe measure of outcome. Children under six years of age appear to differ from this finding somewhat, but this appears to be due to relatively small numbers. They had slightly more symptoms than children exposed to other pesticides and the ratio for life-threatening or residual disability was somewhat higher than the ratio for moderate outcome. This finding was based on two cases. One of these case reported severe burns and the other experienced multiple seizures which were considered to be unknown if related to the exposure to glyphosate. If this latter case were not included, then the pattern of decreasing ratio with more severe effect would be maintained. Overall, glyphosate was less than half as likely to result in serious effects (moderate or major outcome) as all pesticides combined based on over 9,000 exposures.

A similar pattern was seen for cases receiving health care. For occupational cases (Table 2), the ratio of cases receiving health care, hospitalization, and treatment in a critical care unit were 0.66, 0.37, and 0.32 respectively, decreasing with increasing level of medical care. A similar pattern was found for non-occupational adults and older children whose respective ratios were 0.76 for health care, 0.46 for hospitalization, and 0.32 for critical care. For children under six years of age, there was one cases requiring critical care and only 7 cases hospitalized. These relatively low numbers resulted in a ratio of 0.26 for health care, 0.71 for hospitalization, and

0.35 for critical care. When oral exposures, common among children under age six, are excluded, there were only 2 cases hospitalized and none required critical care treatment. Both of the children that were hospitalized experienced seizures that were considered to be unknown if related to their exposure to glyphosate. Thus, even in the most sensitive population, young infants, there was no strong evidence of serious effects from glyphosate.

## II. California Data - 1982 through 2000

Detailed descriptions of 911 cases involving glyphosate, submitted to the California Pesticide Illness Surveillance Program (1982-2000), were reviewed. In 675 of these cases, glyphosate was used alone or was judged to be responsible for the health effects. These 675 cases include only those with a definite, probable or possible relationship. Table 4 presents the types of illnesses reported by year. Table 5 gives the total number of workers that took time off work as a result of their illness and how many were hospitalized and for how long.

Table 4. Cases Due to glyphosate in California Reported by Type of Illness and Year, 1982-2000.

| Year | Illness Type          |     |      |                          |                          | Total |
|------|-----------------------|-----|------|--------------------------|--------------------------|-------|
|      | Systemic <sup>a</sup> | Eye | Skin | Respiratory <sup>b</sup> | Combination <sup>c</sup> |       |
| 1982 | 7                     | 27  | 12   | -                        | -                        | 46    |
| 1983 | 4                     | 24  | 22   | -                        | 2                        | 52    |
| 1984 | 3                     | 24  | 11   | -                        | -                        | 38    |
| 1985 | 7                     | 23  | 11   | -                        | 1                        | 42    |
| 1986 | 6                     | 20  | 6    | -                        | 1                        | 33    |
| 1987 | 5                     | 18  | 8    | -                        | -                        | 31    |
| 1988 | 5                     | 18  | 13   | -                        | 1                        | 37    |
| 1989 | 7                     | 18  | 12   | -                        | -                        | 37    |
| 1990 | 6                     | 21  | 18   | 1                        | 3                        | 49    |
| 1991 | 13                    | 28  | 16   | 1                        | 5                        | 63    |
| 1992 | 11                    | 18  | 12   | -                        | 4                        | 45    |
| 1993 | 6                     | 12  | 11   | -                        | 1                        | 30    |
| 1994 | 5                     | 12  | 6    | -                        | 2                        | 25    |
| 1995 | 4                     | 17  | 14   | -                        | 2                        | 37    |
| 1996 | 6                     | 8   | 7    | -                        | 5                        | 26    |
| 1997 | 3                     | 7   | 10   | -                        | 1                        | 21    |
| 1998 | 4                     | 8   | 6    | 2                        | 3                        | 23    |

|       |     |     |     |   |    |     |
|-------|-----|-----|-----|---|----|-----|
| 1999  | 6   | 7   | 5   | 3 | 0  | 21  |
| 2000  | 4   | 6   | 6   | 1 | 2  | 29  |
| Total | 112 | 316 | 206 | 8 | 33 | 675 |

a Category includes cases where skin, eye, or respiratory effects were also reported.

<sup>b</sup> Category not used until 1990. Prior respiratory cases classified as systemic.

<sup>c</sup> Category includes combined irritative effects to eye, skin, and respiratory system.

Table 5. Number of Persons Disabled (taking time off work) or Hospitalized for Indicated Number of Days After Glyphosate Exposure in California, 1982-1999.

| Time period       | Number of Persons Disabled | Number of Persons Hospitalized |
|-------------------|----------------------------|--------------------------------|
| One day           | 47                         | -                              |
| Two days          | 28                         | 1                              |
| 3-5 days          | 27                         | -                              |
| 6-10 days         | 2                          | -                              |
| more than 10 days | 19                         | -                              |
| Unknown           | 43                         | 6                              |

Starting in 1992, glyphosate was reformulated to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that the reformulated glyphosate used since 1992, have resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to the reduction in eye injuries. More important for the purpose of this review are those illnesses involving bystanders or other workers exposed to drift or residue, rather than handlers exposed directly to the product during application, mixing/loading, maintenance, cleaning, repair, transport or disposal. A variety of worker activities were associated with exposure to methyl bromide as illustrated in Table 6 below.

Table 6. Illnesses by Activity Categories for Glyphosate Exposure in California, 1982-1999

| Activity Category    | Illness Category      |       |       |                          |                          |       |
|----------------------|-----------------------|-------|-------|--------------------------|--------------------------|-------|
|                      | Systemic <sup>a</sup> | Eye   | Skin  | Respiratory <sup>b</sup> | Combination <sup>c</sup> | Total |
| Applicator           | 80                    | 214   | 173   | 5                        | 25                       | 497   |
| Mixer/Loader         | 4                     | 61    | 15    | -                        | 1                        | 81    |
| Clean/Prepare/Repair | 3                     | 16    | 9     | -                        | 2                        | 30    |
| Transport/Disposal   | 2                     | 10    | 3     | -                        | -                        | 15    |
| (Handler-subtotal)   | (89)                  | (301) | (200) | (3)                      | (28)                     | (623) |



|                    |     |     |     |   |    |     |
|--------------------|-----|-----|-----|---|----|-----|
| Direct Spray/Spill | 1   | 6   | -   | 1 | -  | 8   |
| Drift              | 12  | 4   | 2   | 2 | 3  | 23  |
| Residue            | 2   | 3   | 2   | - | 2  | 9   |
| Other and Unknown  | 8   | 2   | 2   | - | -  | 12  |
| Total              | 112 | 316 | 206 | 8 | 33 | 675 |

<sup>a</sup> Category includes cases where skin, eye, or respiratory effects were also reported.

<sup>b</sup> Category not used until 1990. Prior respiratory cases classified as systemic.

<sup>c</sup> Category includes combined irritative effects to eye, skin, and respiratory system.

Table 6 shows that activities that involve direct handling of glyphosate account for over 90% of the illnesses. Only 43 illnesses, 6% of the total, could be ascribed to direct spray/spill, drift, or residue, scenarios that could conceivably occur in Colombia as a result of the spray eradication program. Note that the 43 cases include 3 cases listed as unknown because the exposure could have been either direct spray, drift, or residue which could not be determined. Among the 43 cases, 30 had a causal relationship classified as possible or 70% of the total. Among all 675 cases, only 21% were classified as possible. Another 6 of the 43 cases were classified as having a probable relationship between exposure and health effects and 7 had a definite relationship. Therefore, it should be noted that the evidence for a causative relationship for the majority of cases involving drift or residue is often lacking.

Of the 43 cases, 7 took one day off of work as a result of their illness and 2 people took off two days, and another 2 people took off three days. A possible case picking plums did not know whether pesticides were applied prior to picking, took five days off work. A possible case occurred in a teacher who reported headache, nausea, fatigue, and vomiting after the glyphosate odor was sucked into her classroom by an air-conditioning unit. The final case, a gardener, took 13 days off after pulling weeds and possibly exposed to residue which got in his eyes, resulting in pain, burning sensations, and impaired vision.

Most of the symptoms reported in this group of 43 cases were relatively minor. Symptoms reported in four or more individuals included eye irritation (includes itching, pain, burning), conjunctivitis, rash, swelling, skin irritation (includes itching, blisters, pain, or numbness), throat irritation or burning, nasal congestion, headache, nausea, shortness of breath or breathing difficulty, and asthmatic reactions. Note that these symptoms are consistent with those specified in the fifth edition of *Recognition and Management of Pesticide Poisonings* (Reigart and Roberts 1999) which states that glyphosate is "irritating to the eyes, skin, and upper respiratory tract".

Many of the 43 cases described in the California report involved heavier exposures than are likely to occur as a result of aerial application. For example, most of the direct spray cases resulted when a bystander was inadvertently sprayed by an applicator on the ground and was often drenched. Illnesses due to residue were often the result of extensive contact with soil or foliage recently treated with glyphosate. Reports of illness from drift from an aerial application were relatively rare, accounting for four of the 23 cases reported above.

Out of 1,384 incidents related to drift reported to the California Pesticide Illness Surveillance Program from 1982 through 1997, only 8 cases were related to glyphosate and suffered mild to moderate effects such as headache, dizziness, coughing, sore throat and chest pain. Two individuals reported an allergic reaction which included hives and rash. Glyphosate is second most widely applied pesticide in California (see Wilhoit et al. California EPA web site: <http://www.cdpr.ca.gov/docs/pur/purmain.htm>) and unlike many other pesticides has never been responsible for a large number of illnesses due to drift from a nearby application. California reported the number of applications of glyphosate and all pesticides from 1991 through 1996 (see web site for data). There were 5,576 systemic poisonings (possible, probable, and definite) reported in this time period for all pesticides and 45 systemic poisoning reported for glyphosate. The number of poisonings per 1,000 applications was 0.6204 for all pesticides and 0.0781, thus glyphosate had an estimated rate of systemic poisoning that was only 12% that of all pesticides.

The review of California illness reports suggest that even diluted glyphosate can be a cause of skin, eye, or throat irritation. These effects are almost always self limiting and do not require hospital admission for treatment. Only one of the 675 California cases required hospitalization. This 1999 case occurred in an individual who had

severe respiratory problems after applying glyphosate on three successive days, handled moldy grass clippings, and had pre-existing medical conditions, including asthma.

Systemic illness (as opposed to skin, eye, and respiratory illness), such as headache, nausea, and difficulty breathing have been reported, in sensitive individuals, such as persons with asthma. However, in most such cases, there was insufficient documentation to say that these systemic effects were definitely due to their exposure to glyphosate. There were only 3 systemic cases (primarily headache) due to spray drift that were considered to have a definite or probable relationship between the exposure and the illness.

### III. Literature review

The literature review is arranged according to principle route of exposure. Dermal and ocular routes are of most interest because these are the routes of exposure that persons in Colombia might experience as a result of aerial applications.

#### Dermal effects

Hindson and Diffey (1984a) describe a case of a 64 year-old untanned Caucasian male who developed acute dermatitis after spraying weeds with a glyphosate product. Patch testing with a 1% and 5% aqueous solution of the product were negative. However testing patches followed by exposure to ultraviolet radiation did reveal a marked papulovesicular reaction, indicating a phototoxic reaction. However, subsequent questions were raised about the benzisothiazolone preservative used in this weedkiller (Hindson and Diffey 1984b). Separate testing of the both the glyphosate and the benzisothiazolone, revealed that the benzisothiazolone was the phototoxic agent and not the glyphosate.

Maibach (1986) performed extensive testing of 346 volunteers for evidence of dermal effects of glyphosate including acute irritation, cumulative irritation, photoirritation, and allergic and photoallergic contact potential. The test compound was 98.4% pure (made up of 41% glyphosate) and contained isopropylamine salt of glyphosate, water and surfactant. The test compound was used at full strength and diluted in distilled water. All test subjects were adults and exposed by covering skin with non-woven fiber patches. Baby shampoo, all purpose cleaner, and dishwashing liquid was used for comparison. "Compared to the baby shampoo, the herbicide was statistically indistinguishable in its irritant potential. The tests also show that it did not induce sensitization, photoirritation or photosensitization." The author noted, however, that he could not rule out the possibility that product contaminants might cause sensitization in unusual circumstances. Mild irritation was observed in a few individuals who had concentrated product applied to the skin for 24 hours.

Wester et al. (1991) examined the potential of glyphosate for skin binding, skin absorption and residual tissue distribution. *In vitro* percutaneous absorption through human skin into human plasma was reported to be no more than 2% over a concentration range of 0.5-154  $\mu\text{g}/\text{cm}^2$ . Other testing in rhesus monkeys will not be discussed here. The important finding from this study is that relatively small amounts of glyphosate are absorbed across the skin and therefore, absent moderate to high toxicity, dermal exposure is likely to result in only dermal effects.

Talbot et al. (1991) reviewed 93 cases of glyphosate exposure reported to the emergency room in Taiwan from 1974 through September 30, 1989. Cases involving exposures to other products were excluded. The majority of these cases were suicidal and involved oral exposures. There were two dermal exposures reported both of which were asymptomatic.

Temple and Smith (1992) reviewed a series of cases reported to the New Zealand National Poisons Information Centre. The majority of these cases were unintentional exposures, mostly while spraying glyphosate containing herbicides. "In general, these cases exhibited minor local irritant effects which were self limiting and responded well to symptomatic and supportive care." The authors give three examples of such cases. In the first case, the male adult accidentally rubbed concentrate in his eye and developed edema around the eye and the conjunctiva around the cornea. These symptoms were associated with fast pulse, palpitations, elevated blood pressure, headache, and slight nausea. His symptoms resolved with treatment and he resumed work the next day. In the second example, a male adult sprayed a double strength solution which contacted his hand due to a faulty hand grip on the spray unit. He wiped his face which became swollen with paraesthesia. These symptoms resolved over 48 hours and did not require specific treatment. The third case was accidentally drenched with diluted glyphosate. He developed a vesicular skin eruption especially on his arms and hands associated with burning and itching. This condition required treatment at two monthly intervals.

In a review of skin reactions to pesticides, O'Malley (1997) provided a brief review of glyphosate. His summary is quoted below:

"While technical-grade glyphosate has been shown to be nonreactive in skin and eye irritation studies on

file with the California Department of Pesticide Registration (CDPR), the 39% formulated product causes moderate levels of irritation, a disparity probably due to irritant properties of surfactant(s) in the latter. Virtually all of the cases of eye, skin, and respiratory irritation reported in California have occurred in applicators of the formulated product, and residue is not known to produce skin reaction. In the CDPR series, cases of skin irritation associated with glyphosate were often associated with contaminated work clothing occluding the material directly against the skin."

O Malley's finding is supported by the California Pesticide Illness Surveillance Program, which is regarded as the best, most comprehensive source of information on human pesticide exposure in the United States (U.S. General Accounting Office 1993). This information and the earlier review of data from California, strongly support the conclusion that the dermal risk of glyphosate, as formulated in the United States, is primarily to pesticide handlers with very little or minor risk to others (e.g., bystanders) who may be exposed to glyphosate drift or residue.

There was one recent case report in the literature of a 54 year-old man in Brazil who unintentionally sprayed himself and developed skin lesions six hours later (Barbosa et al. 2001). He developed severe conjunctival hyperemia (excess blood flow) and a rash which became blisters and persisted for 15 days. One month after the exposure he developed symmetrical parkinsonian syndrome. The authors acknowledge that "it is not possible to exclude the coincidence [idiopathic Parkinson's disease] with exposure to glyphosate" and add that no other report of parkinsonism induced by glyphosate has been reported. The authors propose a possible mechanism for excitatory mechanisms but characterize their finding as a hypothesis. Other more detailed studies are underway to determine whether pesticides might be related to Parkinson's disease and any conclusions about the potential involvement of glyphosate will have to await the results of those studies.

Williams et al. (2000) prepared an extensive risk assessment and safety evaluation of glyphosate, partly supported by scientists with the manufacturer. They cite a study by Jauhainen et al. (1991) which evaluated short-term effects among five forest applicators, and compared results with pre-exposure baseline as well as to data from a group of five controls. "There were no effects on hematology, clinical chemistry, ECG, pulmonary function, blood pressure, or heart rate 1 week after application." They also cited California data as reviewed by Pease et al. (1993) and noted that irritation of skin and eye effects were common, but not exceptional taking into account the widespread product use. Reviewing the Temple and Smith (1992) report (reviewed above), Williams et al. suggest that the systemic symptoms reported (e.g., headache, fast pulse, slight nausea) "probably represent a nonspecific response related to pain associated with eye and/or skin irritation." Other studies cited by Williams related to dermal effects have already been reviewed above.

#### Ocular effects

Acquavella et al. (1999) reviewed ocular effects reported to the American Association of Poison Control Centers in the United States from 1993 through 1997. They identified 1513 records involving ocular or dermal/ocular exposure. Information from patient notes kept by at least one Poison Center were also reviewed. More than 80% of the exposures were residential and about 15% were occupational. Only 5% of the calls involved concentrated product. "Approximately 70% of callers had minor effects, primarily transient irritations, attributed to exposure. Ninety-nine percent of those with minor effects complained of eye pain, 3% complained of lacrimation (watery eyes), and 3% complained of blurred vision." Those exposed to more concentrated formulations (>2% glyphosate, >1% Polyethoxylated tallow amine) were more likely to report lacrimation but not blurred vision, however, there was little evidence of a trend between concentration categories and lacrimation. A total of 30 callers (2%) were classified as having a moderate medical outcome, such as persistent irritations, low grade corneal burns or abrasions. There was one caller (0.1%) with a major effect - scarring of the upper palpebral conjunctiva. This patient was wearing extended wear contact lenses that were rinsed and replaced right after the exposure. Over the next 17 days the patient had a corneal abrasion and conjunctivitis which resolved as the vision returned to its pre-exposure state. The additional information on this case suggests the case should be reclassified as moderate because the scarring of the tear duct system, which was thought to be permanent, did heal. There were 95 calls lost to follow-up where medical outcome remained undetermined. In summary, there was some temporary injury in about 2% of the reported cases, but no case of permanent damage.

#### Inhalation exposure

Jamison et al. (1986) conducted a study of pulmonary function in workers handling flax which had previously had the fibers softened and separated and either wetted or treated with glyphosate 6 weeks prior to harvest. The authors concluded that workers had a significant decrease in pulmonary function which was likely due to exposure to the dust. Though there was very little residue of glyphosate at the end of the six weeks, the authors stated that glyphosate could not "be excluded as a cause of the increase pulmonary function impairment observed." However, Williams et al. (2000) took issue with this view, noting that the levels of glyphosate would be very low, "if present at all, and could not be responsible for the altered pulmonary function observed." They felt

the production of dust particles and/or different microorganisms during the process were a more likely explanation.

Pushnoy et al. (1998) reported on a 42 year-old mechanic who cleaned and repaired a spray rig in a confined space. He reported to the emergency department complaining of shortness of breath, irritative cough, dizziness, discomfort in the throat, and coughing up blood. He was admitted to the hospital and diagnosed with acute chemical pneumonitis. The authors suggested that the polyoxyethylene amine surfactant was largely responsible for irritant effects on the mucosal lining and lung tissue, and therefore, the likely cause of the pneumonitis. Goldstein et al. (1999, 5 authors with industry and one with Yale University) took issue with the findings of Pushnoy et al. They argued that neither glyphosate nor any compound in the finished product could vaporize sufficiently even in a poorly ventilated space to cause such an exposure. They added that occupational pneumonitis had never been reported in connection with glyphosate products. The original authors replied that a longer presentation of the circumstances surrounding this case would have permitted Goldstein et al. to reject the alternative exposures (e.g., chlorinated solvent, diesel fuel, welding) they suggested. They further state that even though the vapor pressure of glyphosate was low "we have concluded that the patient's clinical symptomatology resulted from exposure and inhalation of a mixture of vapor and air-borne droplets containing glyphosate . . . that part of the parenchymal reaction was due to the effect of a surfactant (such as polyoxyethylene amine) on the alveolar lining". However, the authors acknowledge that the effect of the surfactant, though it seems plausible, is "based just on clinical evidence".

#### Oral exposure

Inadvertent oral exposure to glyphosate sprayed on coca plants in Colombia is extremely unlikely. Therefore, the review of the scientific literature on oral exposure will be cursory. In a letter to Lancet Sawada et al. (1988) reported on 56 ingestions of glyphosate product. They found that the average dose among fatal cases was 104 ml and 206 ml among fatal cases. They describe the clinical picture as one of hypovolaemic shock likely due to the 15% polyoxyethylene amine surfactant. Of the 56 cases reviewed, 48 cases were attempted suicides, 3 unintentional (all infants), and 5 with unknown intent. Jackson (1988 with Monsanto) responded to the Sawada et al. report and stated that there were no reports of deaths following accidental ingestion.

Kageura et al. (1988) reported on the death of a 26 year old woman who ingested glyphosate in a suicide. They attributed the death to inhalation of vomitus into the lungs causing asphyxiation. Talbot et al. (1991) reviewed 93 cases of glyphosate exposure reported to the emergency room in Taiwan from 1974 through September 30, 1989. Cases involving exposures to other products were excluded. The majority of these cases were suicidal and involved oral exposures. Those cases where the amount ingested was not recorded were also excluded. They noted that some cases had only moderate effects even after ingestion of up to 500 ml and death had resulted from ingestion of concentrate in amounts above 85 ml. Oral ingestions by mistake in seven cases was usually of a small amount and "resulted in only minor mouth discomfort". The authors concluded that "the data suggest that those over 40 years of age, who ingest more than 100 ml, are at the highest risk of a fatal outcome."

Tominack et al. (1991) reported on 97 telephone consultations with the Taiwan National Poison Center involving ingestion of glyphosate-surfactant herbicide concentrate from January 1986 through September 1988. Eighty-eight cases were suicidal, five unintentional, and four with uncertain intention. Non-fatal cases ingested an average of 120 ml (range 5-500 ml) and fatal cases averaged 263 ml (range 150-500 ml). Of these 97, 12 were asymptomatic, 28 had mild, 33 had moderate, and 16 had severe symptoms. Increasing dose and increasing age were significant predictors of fatality. It should be noted that 10 of the 97 cases ingested another substance in addition to glyphosate. They found that ingestion of a mouthful of concentrate or more was capable of producing symptoms including gastrointestinal mucosal injury, pulmonary edema, decreased or absent urine output, metabolic acidosis, leukocytosis, fever, and hypotension that possibly could develop into shock. Similar to the paper cited above, a dose of 150 ml or more and age of 40 years or more were found to be at highest risk of fatal outcome.

Menkes et al. (1991) reported on four cases of suicidal ingestion of glyphosate, one of them fatal. Two of the cases experienced massive fluid and electrolyte loss, probably due to tubular necrosis. After considering all of the evidence concerning the glyphosate and the surfactant the authors stated "it seems unlikely that toxicity can be ascribed solely to the surfactant."

Temple and Smith (1992) reviewed a series of cases reported to the New Zealand National Poisons Information Centre. The majority of these cases were unintentional. Three ingestions are described, two of them fatal. The authors concluded "Small ingestions (less than 5 ml of the concentrate in adults) pose little problem and simple dilution to minimize gastrointestinal irritation should suffice."

Hung et al. (1997) reviewed 53 cases reported between 1992 and 1996 in Taiwan to assess laryngeal injury. Of these, 36 reported significant laryngeal injury was strongly correlated with aspiration pneumonitis (reported in 8

cases). The average amount ingested in such cases was 300 ml.

Lin et al. (1999) reported on a suicide case who drank 150 ml of concentrate (41% isopropylamine salt of glyphosate, 15% polyoxyethylene amine). This 26 year-old man experienced cardiogenic shock which may have been due to transient suppression of the cardiac conduction system and contractility, rather than intravascular hypovolemia.

Chang et al. (1999) reported on 50 patients with suicidal glyphosate-surfactant ingestions and evaluated their upper gastrointestinal tract injuries. Esophageal injury was seen in 68% of patients, gastric injury in 72%, and duodenal injury in 16%. The authors considered these injuries "minor in comparison with those by other strong acids."

Lee et al. (2000) reviewed 131 cases of glyphosate ingestion seen in their emergency department in Taiwan over a seven year period. There were 11 fatalities (mortality rate 8.4%). The most common presentations included sore throat (80%), nausea (74%), vomiting, and fever (41%). The most common laboratory abnormalities were leukocytosis (68%), low bicarbonate (48%), acidosis (36%), elevated AST, hypoxemia (28%), and elevated BUN. Of the 81 cases receiving an electrocardiogram, 15 were abnormal, mainly sinus tachycardia and nonspecific ST-T changes. Twenty-two of 105 patients who had chest x-rays had abnormal infiltrates or patches. Three patients with renal failure all died. Poor outcome was predicted by respiratory distress, renal dysfunction, abnormal CXR, shock, and ingestion of 200 ml or more, altered consciousness, hyperkalemia, and pulmonary edema. The 11 cases that died ingested an average of 330 ml which was higher than the previous reports by Sawada et al. (1988) and Tominack et al. (1991). The authors propose that direct damage to the airway passage is an important factor in severe poisoning.

#### Reproductive effects

There were two studies located that evaluated reproductive outcome in farmers handling pesticides that specifically analyzed for the effects of glyphosate. However, these studies are both retrospective, subject to numerous biases and confounders, and only suggest associations rather than causative relationships. Thus any of these findings would require replication and further evaluation before they could become established. These studies are summarized below.

Savitz et al. (1997) examined male pesticide exposure three months before conception and through conception in relation to pregnancy outcome in an Ontario farm population. The risk for miscarriage was not statistically significant, though somewhat elevated for glyphosate users. This finding was true for both use of glyphosate on crops (17 cases) and in yards (13 cases). A similar result was found for preterm delivery based on 5 cases involving crop use of glyphosate. On the other hand, there was no statistical significance or elevation of risk for small for gestational age infants. The authors acknowledge that the lengthy recall interval may have reduced the quality of information collected on exposure and health outcome. They advise "Replication of these findings in other geographic settings in a study of similar quality would be of value; however, to improve our strategy, the availability of unusually detailed source of historical exposure data would be necessary."

Arbuckle and Mery (2001) evaluated the risk of spontaneous abortion in the same Ontario farm population examined by Savitz et al. (1997). In this refined analysis they found that late abortions were statistically associated with preconception exposure to glyphosate (odds ratio = 1.7, 95% confidence interval 1.0-2.9). This finding is only just marginally significant. The authors state their findings have "several limitations . . . Because dose information was not available, misclassification of exposure is likely." Finally they state their "analyses were designed to generate, not to test, hypotheses". Due to the fact that multiple comparisons were conducted some findings may be due to chance.

#### IV. A Study of Health Complaints Related to Aerial Eradication in Colombia

This report, prepared by the Department of Narino, Municipality of El Tablon De Gomez, makes a concerted effort to identify any health problems that might be related to use of glyphosate in aerial eradication programs. The study was commissioned by the U.S. Embassy in Bogota and conducted independently by Dr. Camillo Uribe, Director of Clinica Uribe Cualla, the national poison control center. Sections of this report are summarized below with the sections numbered in **bold** as in the original report.

##### **1.1 Description of studied area**

This report primarily concerns the area around the municipality of El Tablon in southern Colombia. The total population is given as 16,770, of which 89% is categorized as rural. The main crops in this area include coffee, corn, wheat, oats, potatoes, and illicit opium poppy. It is known that a variety of other more toxic pesticides are used on these crops. The municipality has three health centers, including Aponte, which is the focus of this report. The Aponte health center is staffed by a medical doctor, a nurse, and a nurse's aide. From July 2000 to

February 2001, the primary time period of this report, Dr. Tordecilla was the medical doctor. Aerial eradication of the illicit opium poppy reportedly occurred in this region in June, July, and November of 2000.

### 1.2 Morbidity and mortality in the municipality of El Tablon

The Narino Departmental Health Institute provided summary morbidity and mortality information for the El Tablon De Gomez area and the Aponte settlement for the year 1999. Data for the year 2000 had not yet been officially released, but estimates are provided by a method not specified. Six illnesses likely to be related to pesticide exposure were identified and tabulated, including acute diarrhea, acute respiratory infection, dermatitis, intoxication, conjunctivitis and headache. The author notes that the first three illnesses listed (diarrhea, respiratory infection, and dermatitis) are likely to be related to problems with inadequate nutrition, housing, and lack of health services, rather than due to pesticide exposure. The basis for this listing of symptoms is not specified, but does agree fairly well with the list of symptoms likely to result from glyphosate exposure based on Poison Control Center data, California surveillance reports, and the world literature. Total morbidity for 1999 and estimated morbidity for 2000 are given in the Table below for El Tablon De Gomez and the Aponte Settlement below:

Table 7. Morbidity reported in the El Tablon De Gomez of Colombia in 1999 and estimated for 2000.

| Pathology                       | 1999  | 2000 Estimated |
|---------------------------------|-------|----------------|
| Acute diarrhea                  | 146   | 186            |
| Acute respiratory infection     | 568   | 506            |
| Dermatitis                      | 209   | 265            |
| Poisoning/Intoxication          | 1     | 4              |
| Conjunctivitis                  | 75    | 85             |
| Headaches                       | 139   | 151            |
| Total for 6 suspected illnesses | 1,138 | 1,197          |

Table 8. Morbidity reported in the Aponte Settlement of Colombia in 1999 and estimated for 2000.

| Pathology                       | 1999 | 2000 Estimated |
|---------------------------------|------|----------------|
| Acute diarrhea                  | 181  | 190            |
| Acute respiratory infection     | 199  | 222            |
| Dermatitis                      | 210  | 180            |
| Poisoning/Intoxication          | 4    | 4              |
| Conjunctivitis                  | 87   | 104            |
| Headaches                       | 78   | 95             |
| Total for 6 suspected illnesses | 759  | 795            |

It appears the Aponte settlement is contained within the El Tablon De Gomez area, though this is not entirely clear. The figures in the report are listed by five separate age groups. This reveals, that the majority of the cases

of diarrhea and respiratory infection occurred in children less than five years old, as would be expected given the known demographics of those diseases. Nationwide data show that 53% of intoxications are suicides or suicide attempts, but it is not clear how many of the 13 poisonings listed above might be suicidal or, more importantly, are due to other products such as medications. In both Tables 7 and 8 there is an increase of 5% from 1999 to the estimate for 2000. Given that spraying is reported to have occurred in 2000 and not in 1999, this suggests that the overwhelming majority (95%) of illnesses reported would be background incidence unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that glyphosate was responsible for these complaints.

### 1.3 Epidemiological monitoring system and mandatory notification

In addition to the summary of morbidity, there is a mandatory health reporting system in Colombia for 34 illnesses including pesticide poisonings. The review of these records found no reports of pesticide poisoning for the municipality of El Tablon in the year 2000 or the first 9 weeks of 2001. Weekly reports from Attachment 5 were examined to determine how many pesticide poisonings were reported each month. It was not clear whether the dates on each report represented the starting date or ending date for a reporting period. Regardless of which is correct, it did not appear that the times of spraying correlated with reports of pesticide intoxication.

Table 9. Reports of Pesticide Intoxication provided to the Narino Department of Health Institute, Epidemiology Section January 12, 2000 through March 7, 2001.

| Month in 2000 | Number of Poisonings | Month in 2000 or 2002 | Number of poisonings | Poisonings occurring at time of spraying |
|---------------|----------------------|-----------------------|----------------------|--|
| January       | 0                    | July                  | 11                   | 9  |
| February      | 0                    | August                | 6                    |  |
| March         | 8                    | September             | 12                   |  |
| April         | 13                   | October               | 8                    |  |
| May           | 7                    | November              | 13*                  | 6*                                       |
| June          | 15                   | December              | 2                    |  |
| --            | -                    | Jan. 2001             | 7                    |  |
| --            | -                    | Feb. 2001             | 19                   |  |
| --            | -                    | Mar. 2001             | 0                    |  |

\* Reports for weeks number 43 and 44 in the first half of November were missing.

Out of a total of 121 reported pesticide poisonings in 61 weeks, only 15 occurred during 5 weeks when spraying eradication occurred. This given the variation in the data, this could easily be due to chance and be unrelated to glyphosate exposure. More work would be required to determine whether locations of the 15 suspect poisoning matched the location and timing of spraying.

In 2000, the Narino Department of Health requested all municipalities to report on the effects of spraying on human health. Ten municipalities supplied the following reports:

Three municipalities including Tablon de Gomez, Barbacoas, and Magui reported no cases. However, the reports were completed prior to the November spraying in Barbacoas and Magui and prior to (or perhaps during) the July and before the November spraying in Tablon de Gomez.

Buesaco reported one patient with sore throat, numbness in limbs, and conjunctivitis in June.

In Tumaco, six case of patients with conjunctivitis and dermatitis were reported.

In San Pablo, 50 cases of dermatitis, conjunctivitis, respiratory conditions, and digestive problems were reported after spraying.

In La Cruz, two cases of allergic rhinitis, two cases of dermatitis, and five cases of conjunctivitis were reported.

San Jose de Alban did not report any specific cases, but the scientific coordinator and chief nurse noted increase in gastrointestinal, dermatological and respiratory conditions. The exact quantity of these conditions in relation to spray times was not given.

El Rosario reported five cases of conjunctivitis and rhinitis that might have been related to spraying carried out on July 31.

San Pedro de Cartago reported an increase in gastrointestinal symptoms but no quantitative relationship between illnesses and spray times was provided.

The absence of any reports of pesticide poisoning combined with the information from the ten municipalities is difficult to interpret. Glyphosate is known to cause irritation to the skin, eyes, mucous membranes which may account for some of the reports of sore throat, conjunctivitis, dermatitis and other conditions described above. However, it is not possible to evaluate these reports in any detail due to the lack of any information on how many of these cases experienced exposure immediately prior to their illness and lack of information on investigation of potential alternative causes. This anecdotal information does not provide any substantial evidence of health effects due to glyphosate spraying in Colombia. Many of the reports are consistent with exposure to glyphosate by the dermal route, as reported in California and the literature. So, some number of cases (impossible to estimate) could be related to the aerial eradication program.

## **2.2 Review of report of January 22, 2001 visit to the municipality of El Tablon de Gomez.**

A commission visited the municipality of El Tablon on January 22, 2001 and spoke with Dr. Tordecilla and reviewed health records of his patients. A number of records of skin conditions were noted for the months of October, December 2000, and January 2001. The exact number of cases, selection criteria, and method of analysis was not specified in the summary report. Nevertheless, the commission concluded "that the information available permitted the commission to consider only the possibility of an association between exposure to pesticides and the effects". The commission noted that it lacked the technical expertise, the data on dates and locations of spraying, and therefore could not conclude whether the observed conditions were related to pesticide exposure.

## **2.3 Interviews with Narino department health officials regarding the spraying**

Employees of the Narino Department Health Institute were interviewed. According to a Fatima Health Promoter, he/she thought the children were most affected, suffering gastrointestinal problems and eye irritation. One possible route of exposure was the village water fountains that were reportedly sprayed and that water could reach the water that supplies the settlement. The most common symptoms in children, according to the Health Promoter, were stomach aches and vomiting, which were different from the most common symptoms reported by Lee et al. (2000) which were sore throat and nausea. This suggests that some cause other than glyphosate was responsible for the children's complaints. He/she reported one case of a boy with skin lesions like sores after the spraying. He/she was particularly concerned that peasants receive more health care from the government. He/she also noted that he lost a considerable sum of money when most of his peas were affected by the spraying in June. He/she claimed to have a tape made during the spraying by pilots where they were heard to say they would dump the remainder of their herbicide in a field because they had too much quantity.

A nurse's aide reported that three or four patients with burning eyes, headache, and dizziness were seen at her health center. One boy with a respiratory infection was sent to another health center where he arrived dead. Medical records were sought to substantiate this report but there was no clinical history, autopsy or other information to support it. She referred a patient with urinary problems to the hospital. Subsequent review of the medical records of this case did not find reference to glyphosate exposure and suggested an infectious origin. She said there had been cases of dermatitis, headache, abdominal pain and gastrointestinal symptoms, but could not say whether the symptoms were related to glyphosate exposure. She also was concerned that the government supply aid to this needy population, especially better health services.

Another nurse's aide reported by telephone that her impression was that the number of dermatological consultations had increased. She admitted her impression was subjective and that the reasons for the consultations were the same as in previous years, so she would not commit to there being a relationship between the spraying and these dermatological conditions.

Reports of anecdotal evidence by nurse's aides and the health promoter have little value for establishing any link between the spraying of glyphosate and health effects. Only with follow-up to substantiate the suspicions



could a more substantial case be made. These interviews do not add significant evidence about the health risks of glyphosate used in Colombia.

#### 2.4 Video

Some videos made by reporters were reported at the Aponte Health Center. One of these videos was located and reviewed. It purported to show spraying on November 3, 2000 which caused unspecified "calamities". However, specific evidence of health complaints in humans was, apparently, not provided.

This video does provide opinion but does not add substantive information about the potential health effects of glyphosate used in Colombia.

#### 2.5 Review of records of patients treated at Aponte Health Center - Sept. 2000 to Jan. 2001

There were 29 cases reported by Dr. Tordecelli and clinical records were obtained for 21 of them. Two other reports of skin lesions were sought but could not be confirmed. After careful review of the 21 records, it was determined that all but four cases were likely due to other causes. Most had skin conditions known to be related to bacteria or parasites, not chemical exposures and the onset of their symptoms did not correspond with the times of spraying. There were seven patients whose symptoms started after spraying and three of these were conditions known to be caused by bacteria or parasites. For the remaining four cases possibly related to glyphosate spraying, one was an allergic reaction that had been seen in this patient before when there was no spraying. A second and third case were contact eczema that is endemic in this region and thought to be more likely due to an infectious origin. One of these two cases did not initiate until 52 days after the last spraying. The fourth case was dermatitis on the thigh which would typically be protected by clothing and thereby protected from aerial spray applications. This reviewer agrees with the conclusion that "the twenty-one clinical histories . . . reveals that any relationship between aerial eradication with the herbicide glyphosate and the skin conditions treated in Aponte is unlikely".

In summary, the evidence collected and presented in this report cannot confirm the glyphosate used in Colombia as the likely cause of a single illness. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, a respiratory passages and suggesting that the Cosmo-Flux 411F added to the glyphosate in Colombia has little or no effect on the overall toxicity of the formulated product. If true, this would mean that the evaluation of glyphosate, as used in the United States and elsewhere, would be expected to have the same toxicologic properties and effects as glyphosate formulated in Colombia.

Rather than review incomplete medical records, it would be better to collect information prospectively. For example, if pesticide poisoning is a mandatory reporting condition, a form documenting the exposure, health effects and medical data on each case could be designed and used to establish whether any particular conditions might be related to spraying glyphosate. Without prospective collection of data and follow up it is difficult to evaluate potential health effects of glyphosate.

#### V. Conclusions

There is some data to suggest that the spray eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on timing of application, history of exposure, and medical documentation of symptoms related to glyphosate exposure were not available. Thus, not a single case of the reported symptoms can be confirmed as caused by the spray applications. The information so far collected gives the impression that any increase in health problems is likely to be relatively small at most and the severity of those symptoms is likely to be minor to moderate at most. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that glyphosate spraying has been a significant cause of illness in the region studied. Some of the reports in Colombia, potentially related to glyphosate, are similar to those reported in the literature and by California. These cases report irritation to skin, eyes, a respiratory passages and suggesting that the Cosmo-Flux 411F added to the glyphosate in Colombia has little or no effect on the overall toxicity of the formulated product. Colombia. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

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**SECTION 4. Ecological Risk Assessment for the use of Glyphosate Herbicide as Part of the U.S. Supported Aerial Eradication Program of Coca in Colombia.**

**I Introduction**

At the request of the Department of State (DoS), the Office of Pesticide Programs (OPP) of the U.S. Environmental Protection Agency has developed an ecological risk assessment for the aerial coca eradication program in Colombia. The DoS met with members of OPP on April 18, 2002 to provide information on exposure and use of the glyphosate tank mixture for aerial eradication of illicit coca in Colombia. This assessment is based on the information provided in that meeting and in the appendix included in the formal request from the Secretary of State. The eradication program includes the use of a spray mixture of a glyphosate formulation, an adjuvant (Cosmo-Flux 411F) and water. The glyphosate tank mixture is applied aerially as a foliar application in certain provinces within Colombia.

**II Background**

Approach to Environmental Fate and Ecological Risk Assessments of Pesticides

Before a pesticide can be sold in the United States, the Agency requires pesticide companies which request product registrations in the U.S. to perform certain required environmental fate and ecological effects studies and to submit the resulting data. OPP uses the environmental fate studies to assess potential environmental exposure; data requirements are listed in the regulations (40 CFR ◆ 158.290). The ecological effects studies are used to assess potential toxicity to non-target organisms; data requirements are established in 40 CFR ◆ 158.490 (Terrestrial and aquatic organisms data requirements), ◆ 158.540 (Plant protection data requirements), and ◆ 158.590 (Nontarget insect data requirements).

All non-target terrestrial and aquatic animal toxicity studies, and aquatic plant studies, are performed using the technical grade active ingredient (TGA). Non-target terrestrial plant toxicity tests are performed with pesticide in a formulated product (as sold to users). Aquatic fish and invertebrate toxicity studies using formulated product are also required if the use of the formulation is expected to lead to transport to water bodies, either directly or through runoff. The potential exposure and toxicity of each pesticide are considered to characterize the potential of ecological risk.

The present environmental fate assessment is based on regulatory environmental fate studies submitted to the Agency to support the registration of glyphosate salts and their formulated pesticide products. These studies were conducted under Good Laboratory Practices (GLP), as required under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The studies used in the assessment have been deemed acceptable and have served to generate previous environmental and ecological risk assessments for glyphosate.

The number and types of environmental fate studies required for each pesticide depends on its proposed use pattern (terrestrial, aquatic, forestry, indoors, greenhouse). The required studies consist of a series of core laboratory studies for all pesticides and field dissipation studies for pesticides used on outdoor crops (terrestrial/aquatic), non-crops (terrestrial/aquatic), and forestry. Each study provides specific data that, together with the physical and chemical properties of the pesticide, are then combined to produce an integrated environmental fate assessment and to identify the potential of the pesticide to leach to groundwater, and/or reach surface water, and/or bioaccumulate in aquatic organisms. The data are also used as input parameters in models to estimate exposure concentrations in the environment. Monitoring data, if available, are also incorporated into the assessment.

The limited number of species and environmental systems tested can introduce a degree of uncertainty when attempting to extrapolate the data outside the experimental conditions of the studies, such as different soils, geographical regions, and ecosystems. As part of the overall risk characterization of a pesticide, the Agency also identifies uncertainties associated with the available data and those introduced by the assumptions needed to estimate concentrations using models.

**III Ecological Risk Assessment**

**Glyphosate***Terrestrial*

The Agency does not expect any risk to birds and mammals based on dietary exposure to active ingredient glyphosate. Acute avian dietary studies using bobwhite quail and mallard ducks resulted in no mortality at concentrations up to 5200 ppm, and no reproductive effects were seen up to 1000 ppm, the highest levels tested. Toxicity tests involving feeding or direct contact of honey bees to glyphosate also resulted in no mortality at the highest rate tested (100 micrograms/bee). Acute LD<sub>50</sub> values could not be established in oral and dermal mammalian studies at concentrations up to and including 5000 mg/kg, and chronic mammalian effects were only seen in a series of studies at 1000 mg/kg/day or higher. The Agency waived the requirement for an acute inhalation study for mammals with active ingredient glyphosate since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats.

Risk to non-target terrestrial plants is likely from exposure to glyphosate as a result of its use in the coca eradication program. Glyphosate is a foliarly applied, broad spectrum herbicide effective at very low exposure rates. Vegetative vigor studies for North American crops reviewed by the Agency in 1999 indicate that 25% of exposed plants can be damaged by exposure to glyphosate applied at rates as low as 0.07 lb ai/A.

Table 1. Vegetable Vigor Toxicity of Glyphosate Wettable Powder to US Crops

| Species         | Parameter     | EC <sub>25</sub><br>(lbs ai/A) | NOEL<br>(lbs ai/A) |
|-----------------|---------------|--------------------------------|--------------------|
| Cucumber        | phytotoxicity | 0.074                          | 0.049              |
| Lettuce         | dry weight    | 0.217                          | 0.148              |
| Oilseed rape    | phytotoxicity | 0.098                          | 0.049              |
| Okra            | dry weight    | 0.172                          | 0.049              |
| Radish          | phytotoxicity | 0.235                          | 0.148              |
| Soybean         | dry weight    | 0.126                          | 0.049              |
| Sugarbeet       | "             | 0.277                          | 0.148              |
| Corn            | phytotoxicity | 0.227*                         | 0.148              |
| Oat             | dry weight    | 0.201                          | 0.148              |
| Purple nutsedge | "             | 0.805*                         | 0.445              |
| Winter wheat    | "             | 0.176*                         | 0.049              |

\* Determined by linear interpolation.

The application rate of glyphosate recommended by the State Department for the coca eradication program is 3.34 lb ai/A in acid equivalents. This is well above the rates listed in the table above. AgDrift modeling of potential spray drift from the use in Colombia (detailed below) simulates that non-target plants hundreds of feet away may be exposed to a fraction of this glyphosate application. Based on the toxicity data for North American crops, AgDrift indicates the possibility that 50% of young crop plants would be expected to show measurable reductions in dry weight from 150 to nearly 600 feet downwind (depending on spray and wind conditions). Some affected plants would likely recover while more sensitive plants may die, have reduced reproductive success, or reduced yields (crop plants).

### Aquatic

Laboratory studies indicate glyphosate is slightly toxic to fish, invertebrates and aquatic plants. The lowest resulting acute LC<sub>50</sub> values (concentrations at which half the test animals died) were in parts-per-million (ppm) for active ingredient glyphosate. For instance, the most sensitive freshwater fish (fathead minnow) had an LC<sub>50</sub> of 85 ppm, while chronic effects were not seen in another study at the highest test concentration of 26 ppm. The EC<sub>50</sub> (level at which adverse effects are seen in half the test animals) for the freshwater invertebrate *Daphnia magna* was 134 ppm, and the chronic NOEL 50 ppm.

OPP exposure models indicate that surface-water exposure in the parts-per-billion could be expected from the use on coca. OPP also considered a more conservative exposure scenario of the direct application of 3.75 lb acid eq./acre of glyphosate to a 1-acre, 6-foot deep pond<sup>2</sup>. The calculated maximum concentration of 230 ppb is well below the glyphosate toxicity values measured for aquatic organisms in the laboratory. Therefore, aquatic organisms should not be at risk from exposure to glyphosate. The environmental fate assessment which is the basis of this exposure calculation is described in the following section.

<sup>2</sup>Salts of glyphosate (isopropylamine, diamine, and trimesium) are registered in the United States for a wide variety of agricultural and non-agricultural uses. All of the salts of glyphosate generate the "free acid of glyphosate" (glyphosate acid), the actual herbicide-active chemical. The glyphosate acid equivalents vary from salt to salt, as it depends on the ratio of the molecular weight of the glyphosate free acid to that of the salt. For this reason, application rates are generally expressed in terms of "glyphosate acid equivalents" when estimating exposure concentrations of glyphosate in water and soil. The ratio of glyphosate acid to the glyphosate isopropylamine salt is 0.75. Thus, each pound of this salt is equivalent to 0.75 pounds of glyphosate acid (or 1 g of the salt is equivalent to 0.75 g of the acid)

It is possible that much greater exposure could occur from direct overspray of water bodies much smaller than a 1-hectare, 6-foot deep pond, but such simulation is not a standard component of Agency risk assessments. The product label of the specific glyphosate product DoS indicates is being used against coca, and the DoS application guidelines, prohibit direct overspray of water bodies. It is possible that some ecologically important water bodies too small to appear on maps could be sprayed directly in a project as large as the coca eradication program. EPA has registered other glyphosate products for direct application to aquatic sites to kill undesirable vegetation.

Freshwater aquatic plants also seem unlikely to be at risk from exposure to active ingredient glyphosate. Submitted studies resulted in EC<sub>50</sub> values of 12.5 ppm for green algae (*Selenastrum capricornatum*), 21.5 ppm for duckweed (*Lemna gibba*) and 38.6 ppm for the freshwater diatom *Navicula pelliculosa*. These values are well beyond the 230 ppb exposure calculated for direct overspray in the pond simulation described above.

### Risk Specific to Formulations of Glyphosate

Ecological toxicity studies submitted to EPA for some of the formulations of glyphosate products that EPA has registered have shown them to be more toxic than glyphosate alone. The results of these studies indicate that the formulations will pose a risk primarily to non-target plants, as described above. For instance, the minimum bluegill sunfish LC<sub>50</sub> of 5.8 ppm reported for a 41.8% glyphosate formulation in EPA's glyphosate reregistration eligibility document (RED, 1993) is 20 times more toxic than the bluegill sunfish LC<sub>50</sub> observed for technical glyphosate, but is still much higher than exposure levels expected in the environment. The bluegill sunfish LC<sub>50</sub> for a test with surfactant MONO818 by itself was 1.0 ppm.

The risk to non-target terrestrial and aquatic animals from formulated glyphosate used for coca eradication is uncertain because the Agency does not have relevant toxicity data for the Colombian formulation, nor for the adjuvant Cosmo-Flux 411F. An adjuvant is a subsidiary ingredient or additive in a mixture that adds to the effectiveness of the primary or active ingredient. Adjuvants are most commonly added to tank mixes of pesticide products before they are applied. Further discussion is provided in the Health Effects Division's assessment of the coca eradication program.

### Potential Spray Drift of Glyphosate

The AgDrift model (version 2.01) was used to estimate downwind deposition of aerial applications of herbicide sprays during coca eradication efforts. The aerial part of the AgDrift model, which was used in this assessment, was developed from USDA Forest Service models designed to estimate deposition of forestry applications. The model has been the subject of a Scientific Advisory Panel (SAP) meeting<sup>3</sup> and showed a good correlation with field trial data of downwind deposition. Reviews and descriptions of AgDrift have been published.<sup>4</sup>

AgDrift uses a number of input parameters associated with the application equipment and the meteorology

during application in calculating deposition levels. An attempt was made to enter important input parameters appropriate for coca eradication applications in Colombia as described by the Department of State (DoS) in their presentation<sup>5</sup> to the Office of Pesticide Programs (OPP) or in documents provided by DoS to OPP. Many input parameters in AgDrift do not greatly affect deposition levels and a number of default inputs were used for these parameters. The inputs considered to be more important in determining drift levels that were used to model coca eradication spraying are listed in Table 1 below.

<sup>3</sup><http://www.epa.gov/scipoly/sap/1997/december/spraydrift.htm>

<sup>4</sup>Hewitt AJ, DR Johnson, JD Fish, CG Hermansky, and DL Valcore. 2002. Development of the Spray Drift Task Force database for aerial applications. *Environmental Toxicology and Chemistry*. 21(3) pp. 648-658. Teske ME, SL Bird, DM Esterly, TB Curbishley, SL Ray, and SG Perry. 2002. AgDRIFT: A model for estimating near-field spray drift from aerial applications. *Environmental Toxicology and Chemistry*. 21(3) pp. 659-671. Bird SL, SG Perry, SL Ray, and ME Teske. 2002. Evaluation of the AGDISP aerial spray algorithms in the AgDRIFT model. 2002. *Environmental Toxicology and Chemistry*. 21(3) pp. 672-681.

<sup>5</sup>April 18, 2002. Crystal City, Arlington, VA.

There are a number of general uncertainties associated with AgDrift modeling to estimate spray drift from coca spraying in Colombia. The AgDrift model is intended to represent a flat area with uniform vegetation while coca cultivation is reported to occur in some instances on irregular topography with scattered trees and shrubs. The AgDrift model is not intended to model spray drift under very stable atmospheric conditions (e.g. temperature inversions). Although coca eradication efforts attempt to avoid these conditions they can be difficult to detect.

Table 1. AgDrift model (version 2.01) inputs used to model spray drift deposition from coca eradication spraying in Colombia.

| Parameter        | Input   | Comment   |
|------------------|---|---|
| Aircraft         | Air Tractor<br>AT-802A                                    | The spray program is reportedly buying AT-802A aircraft for spraying operations. The AT-802A is heavier than the currently used Ayers T-65 Thrush which may result in slightly higher drift levels.   |
| Spray volume     | 2.53 gal/acre   | Reported in (1)   |
| Nonvolatile rate | 5.49 lbs/acre   | Calculated from values reported on p. 4 in (1):<br>Water = 0.74<br>Surfactant and a.i. = 0.26<br>$2.53 \text{ gal/acre} * (0.26 \text{ Surfactant and a.i.}) = 0.66 \text{ gal/acre}$<br>$0.66 \text{ gal/acre} * (8.35 \text{ lbs/gal}) = 5.49 \text{ lbs/acre}$   |
| Droplet spectrum | ASAE medium<br>or<br>ASAE very coarse to extremely coarse | In (1) the droplet size spectrum is reported to have a volume median diameter of 300 to 1,500 microns. This is a large range for one of the most important factors in estimating off-target drift. Two categories of droplet size spectrum were chosen to represent the range. ASAE medium sprays have a VMD of approximately 300 microns. The ASAE very coarse to extremely coarse is the coarsest ASAE spray available in AgDrift 2.01 with a VMD of 520 microns. It was not stated if droplet size was measured under application conditions.<br><br>In the presentation at OPP offered by the DoS the VMD during application was said to be 200 to 300 microns. |
| Wind speed       | 3 & 10 mph  | Reference (1) p.6 states missions are canceled if wind speed measured at the airport is above 10 mph. Wind speed at the target site may vary but 10 mph was used as the best available input for modeling.  |
|                  |   | Reference (1) p.6 states missions are canceled if relative humidity measured at the airport is above 75%. Relative humidity at the  |

|                   |              |  |
|-------------------|--------------|--|
| Relative humidity | 75%          | target site may vary but 75% was used as the best available input for modeling.  |
| Temperature       | 90 degrees F | Reference (1) p.6 states missions are canceled if temperature measured at the airport is above 90 degree F. Temperature at the target site may vary but 90 degree F was used as the best available input for modeling. |
| Release height    | 100 ft       | Reference (1) p. 6 states the altitude above spray targets is normally less than 100 feet. This value was used as the best available input for modeling.   |
| Spray lines       | 4            | Based on video of spraying operations with multiple aircraft, the number of spray lines used in modeling was 4.  |

(1) Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application. An undated, unsigned, 9-page document provided to OPP by the State Department.

In addition to the general uncertainties above, there are also uncertainties associated with the inputs used for modeling the spray applications. Droplet size is one of the most important parameters affecting drift of pesticides. There is uncertainty as to the droplet size spectrum used in aerial coca spraying. Documentation supplied by the DoS<sup>6</sup> describes the droplet size used in terms of the volume median diameter (VMD) which is the droplet size for which half of the volume of spray is contained in droplets with smaller diameter and half of the spray is contained in droplets of larger diameter. The VMD was stated to range from 300 to 1500 microns which is a wide range. In the DoS presentation the VMD was stated to be 200 to 300 microns during application conditions. In addition to the wide range of VMD values presented, VMD is not a good descriptor of droplet size spectra for estimating spray drift. Spray drift is predominately associated with finer sprays and VMD does not define the amount of small droplets contained in spray. Although specific data on droplet size under application conditions was not provided, it is unlikely that very coarse sprays would be achievable due to shearing effects of releasing droplets at high airspeeds. Large droplets released into the turbulence created by an aircraft traveling in excess of 120 mph tend to break into smaller more driftable droplets.

<sup>6</sup>Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application. An undated, unsigned, 9-page document provided to OPP by the State Department.

Other uncertainties associated with inputs include inputs for meteorology and release height. AgDrift modeling requires site-specific inputs for meteorology. In coca eradication efforts (as well as agricultural applications in the US) wind speed, temperature and humidity are measured at the airport which may not be representative of these parameters at the application site. The applicator is ultimately given the responsibility of determining if conditions at the target site are acceptable. DoS reports that the coca eradication program selects experienced applicators for spray missions with the expectation they will better be able to identify unacceptable conditions and make applications within specified parameters.

In order to capture the range of deposition values expected during coca eradication applications, AgDrift was run with two droplet size spectra and at two wind speeds. The droplet size spectra were extremely coarse to very coarse and medium. The definitions refer to the American Society of Agricultural Engineering (ASAE) Standard 572 definition of droplet size spectra. The wind speeds used were 3 mph and 10 mph. AgDrift was run in tier 3 to estimate downwind depositions shown in Figure 1 below.

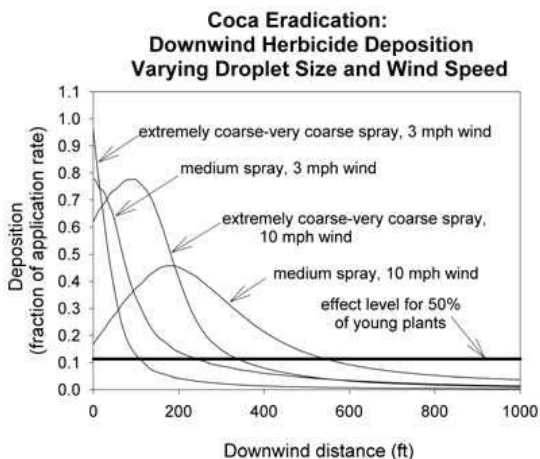


Figure 1 shows the lowest levels of drift are associated with applications using the extremely coarse to very coarse sprays at a 3 mph wind speed. The highest levels of drift are associated medium sprays at wind speeds of 10 mph. Downwind deposition levels from coca eradication spraying is likely to be bounded by these estimates. The effect level for 50% of young plants<sup>®</sup> is based on glyphosate toxicity studies on ten crop plants. At the level corresponding to approximately 11% of the application rate, 50% of plants species would be expected to show measurable reductions in dry weight. Of the affected plants some would likely recover while more sensitive plants may die, have reduced reproductive success, or reduced yields (crop plants).

#### V. Environmental Fate and Transport Assessment of Glyphosate

##### *Integrated Environmental Fate Assessment- Summary*

The major route of transformation of glyphosate identified in laboratory studies is microbial degradation. In the field, glyphosate dissipation appears to correlate with climate, being more persistent in cold than in warm climates. Dissipation of glyphosate in Colombia may therefore be more rapid than in the U.S. Glyphosate was not observed in laboratory studies to break down by abiotic processes such as hydrolysis and direct photolysis.

Glyphosate is very soluble, and has a low potential to volatilize, but adsorbs strongly to soils and sediments. Therefore, glyphosate does not have a high potential to leach to ground water or reach surface water as dissolved runoff. However, glyphosate has the potential to contaminate surface water as a result of residues adsorbed to soil particulates suspended in runoff water. Offsite exposure is also possible due to spray drift or inadvertent direct overspray.

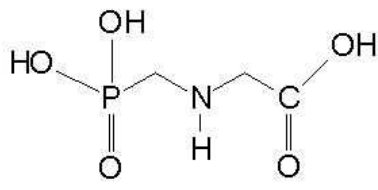
##### *Physical and chemical properties of glyphosate acid*

Glyphosate belongs to the glycine family of herbicides. Glyphosate is a phosphono derivative of glycine, the simplest of all of the amino acids. It works as an herbicide by inhibiting the enzyme 5-enolpyruvyl-shikimate-3-phosphate<sup>®</sup> synthase (i.e., it is an ESPS inhibitor). Glyphosate is not an organophosphate and it is not an inhibitor of cholinesterase activity.

Chemical name: N-(phosphonomethyl)glycine

Chemical Abstracts Registry Number: 1071-83-6

Chemical structure:



##### **Physical and chemical properties of glyphosate relevant to the environmental fate assessment**

|                                |  |
|--------------------------------|--|
| Physical and chemical property |  |
|--------------------------------|--|



|   |  |
|---|--|
| Molecular formula   | C <sub>3</sub> H <sub>8</sub> NO <sub>5</sub> P  |
| Molecular weight  | 169.07   |
| Solubility in water   | 12,000 mg/L 25 <sup>o</sup> E C (very soluble)   |
| Vapor pressure  | 4.3 x 10 <sup>-10</sup> , mmHg at 25 <sup>o</sup> E C (does not readily volatilize)<br>1.8 x 10 <sup>-10</sup> , mmHg at 45 <sup>o</sup> E C |
| Henry's Law Constant  | 9.6 x 10 <sup>-17</sup> , atm-m <sup>3</sup> /mole, estimated at 25 <sup>o</sup> E C   |
| n-Octanol-water partition coefficient (Kow)<br>(as log Kow) | -4.0   |
| pK <sub>a</sub>   | Glyphosate is a zwitterion<br>pK <sub>a1</sub> = 2.6<br>pK <sub>a2</sub> = 5.6<br>pK <sub>a3</sub> = 10.6                                    |

*Transformation, persistence and transport in soils*

The major route of transformation of glyphosate in soils is microbial degradation. In laboratory studies in soils incubated under aerobic conditions, <sup>14</sup>C-labeled glyphosate degraded with half-lives ranging from 1.85 to 5.4 days in two sandy loam soils, and 2.06 days in a silt loam. These studies were conducted in the absence of light and at 25<sup>o</sup>E C. The major degradate that formed in these soils was aminomethyl phosphonic acid (AMPA), which reached a maximum of ca. 29% at 40 days, but declined afterwards. After 1 year, ≈70% of the applied radioactivity was found as <sup>14</sup>CO<sub>2</sub>, indicating that the ultimate fate of glyphosate and AMPA is mineralization (i.e., formation of CO<sub>2</sub> and inorganic carbonates and bicarbonates). Photolysis on soil is not a degradation route for glyphosate, as the half-lives under both irradiated and dark conditions were 6.6 days and any degradation that occurred during the studies was likely to be microbial.

Batch-equilibrium adsorption studies in a wide range of soils and sediments from the US and United Kingdom have shown that glyphosate and AMPA adsorbed strongly to soils, with adsorption coefficients (K<sub>ads</sub>) ranging from 9.4 to 700 mL/g. Therefore, glyphosate has a low potential to leach to groundwater or reach surface water by runoff, but may enter surface water through soil erosion.

Terrestrial field dissipation studies conducted with a formulation of the non-radiolabeled isopropylamine salt at an application rate of 10.7 lb of salt/acre (7.95 lb acid equivalent/acre) showed that dissipation (i.e., transformation plus transport) was slower in colder than in warmer climates. The reported half-lives at each site were 2.9 days in Texas, 13 to 20 days in Georgia, California and Arizona, 127 days in New York, and 140 days in Iowa. Glyphosate and AMPA were found predominantly in the 0 to 6 inch layers, indicating that they are not potential leachers. All of these studies were conducted with the formulation applied directly to soil in bare ground plots. Glyphosate is a foliar herbicide that is not applied directly to soils and would only reach soil by wash-off from foliage. Therefore, direct application to soils in bare ground plots represent a worse case of glyphosate use.

The low vapor pressure of glyphosate (4.3 x 10<sup>-10</sup>, mmHg at 25<sup>o</sup>E C and 1.8 x 10<sup>-10</sup>, mmHg at 45<sup>o</sup>E C) suggests that it has low potential to volatilize from soils.

*Transformation, persistence, and transport in water*

Laboratory studies suggest that abiotic hydrolysis (i.e., hydrolysis in the absence of microorganisms) is not a primary degradation pathway for glyphosate. Glyphosate remained stable for at least 30 days in sterile aqueous buffered solutions of pH 5, 7 and 9 that were kept in the dark at 25<sup>o</sup>E C. Buffered solutions of glyphosate were stable to sunlight, suggesting that direct photolysis is not a likely degradation pathway for glyphosate. EPA has no data at this time to assess any contribution of indirect photolysis in natural waters.

The half-life of glyphosate in a silty clay loam sediment incubated under anaerobic conditions (flooded plus a nitrogen atmosphere) was estimated as 8.1 days and 199 days in a water-clay loam sediment system. Most of applied radioactivity was found in the sediment phase. The major metabolite was AMPA, which also remained associated with the sediment. The observed half-life in an aerobically incubated silty clay loam sediment was 7 days.

Aquatic field dissipation data showed that the half-life of glyphosate in water used as irrigation source was 7.5 days (farm pond in Missouri, 408816-01). In Michigan, Georgia, and Oregon pond and stream water systems, glyphosate dissipated rapidly immediately after treatment. Accumulation was higher in the pond than in the stream sediments (415528-01).

The low Henry's Law constant of glyphosate suggests that glyphosate is not likely to volatilize from water. Given the strong adsorption to sediments, glyphosate is most likely to be associated with the sediment. The very low *n*-octanol-water partition coefficient is indicative that glyphosate is not likely to bioaccumulate in aquatic organisms.

#### *Dissipation in a forestry environment*

Residues of an aerially applied glyphosate product at a rate of 3.75 lb of acid equivalents/acre declined rapidly from tree foliage in less than 1 day at the Michigan and Georgia sites and less than 14 days at a site in Oregon. The rate of dissipation in the foliage (wash-off) correlated with the amount of rainfall and leaf drop, which also determines the movement of glyphosate and AMPA through the forest ecosystem. The average half-life for overall dissipation from the forest ecosystem was 100 days for glyphosate (35 to 158 days) and 118 days for AMPA (71 to 165 days). In all cases, the maximum combined residue of glyphosate and AMPA in soil was less than 5 ppm, but the amount of residues declined with time (MRID 415528-01).

## **VI. Risk Characterization**

The ongoing use of a glyphosate spray for coca eradication is likely to pose a risk to non-target plants. Vegetative vigor toxicity laboratory tests performed using a formulated glyphosate product (glyphosate acid WP 48.3%) on North American crops indicated toxicity to terrestrial plants with applications of less than 1.0 lb of active ingredient per acre (lb ai/acre) (Table I). The State Department proposes to use a rate of 3.34 lb acid equivalents/acre for direct, aerial application to coca. A second application is possible if fields are replanted, or the first is determined after 3 to 6 months to have been inadequate. The product reported by DoS as used in Colombia has a formulation which matches the formulation of a product that is registered, but not used, in the United States.

AgDrift modeling of potential spray drift indicates that non-target plants hundreds of feet away may be exposed to a fraction of this glyphosate application. Based on the toxicity data for North American crops, AgDrift indicates the possibility that 50% of young plant crops would be expected to show measurable reductions in dry weight from 150 to nearly 600 feet downwind (depending on spray droplet size and wind conditions). As detailed below, there are several hundred non-target terrestrial plant incident reports in the Agency's Ecological Incident Information System (EIS) database connected with the use of glyphosate products.

There is uncertainty whether crops or other plants in Colombia, whether similar to crops tested in the United States or not, would be affected similarly at the same exposure levels. However, since glyphosate is an effective, broad spectrum herbicide, risk to non-target plants outside of the application zone would be expected. The Agency's EIS database includes several hundred reports of possible non-target plant incidents in the United States attributed to use of glyphosate.

This use of the active ingredient glyphosate itself would not pose a significant direct risk to terrestrial or aquatic animals, although temporary secondary adverse effects from the loss of habitat in the spray area may occur. Neither acute nor chronic adverse effects were observed in mammalian and avian laboratory toxicity tests using the active ingredient alone. Mortality was observed in fish and aquatic invertebrate studies. However, the resulting acute LC<sub>50</sub> values (concentrations at which half the test animals died), and lowest effect levels for chronic effects, were in parts-per-million. Toxicity endpoints for aquatic plants also ranged from 0.85 to 39.9 ppm. Considerably lower surface-water exposure, in the parts-per-billion, could be expected from the use on coca using runoff simulations from Agency exposure models. The Agency considered an even more conservative scenario, estimating the concentration that would result from the direct application of 3.75 lb acid eq./acre of glyphosate to a 1-acre, 6-foot deep pond. The calculated maximum concentration of 230 ppb is well below the toxicity values measured for aquatic organisms in the laboratory.

It is possible that much greater exposure could occur from direct overspray of water bodies much smaller than a 1-acre, 6-foot deep pond, but such simulation is not a standard component of Agency risk assessments. It is possible that some ecologically important water bodies too small or ephemeral to appear on maps could be

sprayed directly in a project as large as the coca eradication program.

There are several aspects of an ecological risk assessment which, while included as a regular part of the U.S. registration process, are not relevant to the use of glyphosate on coca. In considering the risk of a chemical to terrestrial or aquatic animals in the United States, the Agency has set levels of concern (LOCs) at between 5 to 20% of the acute toxicological endpoints for further consideration of risk to endangered species, or eligibility of a chemical for Restricted Use (application permitted only by Certified Pesticide Applicators.) Our document does not include endangered species because the Agency lacks information on the species which might be present in areas of spraying. In addition, the Health Effects Division determined that results of mammalian toxicology studies did not warrant the establishment of a chronic toxicological endpoint for the calculation of a Reference Dose (RfD, a reference endpoint for human health risk assessment ) for glyphosate. Since there is not a chronic endpoint, a drinking water exposure assessment is not necessary for the use of glyphosate on coca.

Although the measured toxicity and estimated exposure indicate that only non-target plants are likely to be adversely affected by the use on coca, there are important uncertainties that should be considered. One of these, which was emphasized by the Amazon Alliance in a memo to the Agency, is the extrapolation of North American data to the conditions and wildlife found in Colombia. The toxicity of a pesticide to different classes of animals and plants can vary widely among species within an individual ecosystem. The Agency uses the test species as surrogates for other North American species not tested, but has little experience with tropical flora and fauna. Similarly, laboratory and field estimates of the environmental fate of pesticides, including potential surface- water contamination, are performed with North American soils, hydrology and climate data.

The potentially most important uncertainty in this risk assessment concerns differences in the formulation and tank mix for use in Colombia from those used in the United States. Toxicity studies indicate that U.S. formulations of glyphosate are more toxic to non-target animals than the technical product alone, but not toxic at levels of expected exposure. However, none of the ecological effects studies submitted to or encountered by the Agency for glyphosate were performed with the formulation that the DoS has indicated is used in Colombia, which may contain different types of cationic surfactants than those in formulations for which the Agency has data. Consultant Jeremy Bigwood presented a literature search of over 200 citations to the Ecuadorian Minister of the Environment in March 2002, stating that there have been NO scientific investigations on the past or present formulations being used in Colombia.

In addition, the Agency does not have ecological toxicity information on adjuvant Cosmo-Flux 411F, which is neither manufactured nor sold in the United States. There is some inconsistency in the description of Cosmo-Flux in the two available labels, in Spanish and in English. However, all of the individual ingredients (surfactants) which comprise the adjuvant are substances with low oral and dermal mammalian toxicity. The toxicity of the blend of these surfactants is not known; although the Agency often requires formulation toxicity data for non-target plants and aquatic organisms, tank-mix adjuvants are not required to be included in these studies.

#### Reports From External Sources

The effect of Cosmo-Flux 411F or its individual ingredients on non-target organisms is unknown, although Mr. Bigwood suggests some possible effects in his report to the government of Ecuador. Mr. Bigwood cites studies from the Western Australia Department of Environmental Protection (WADEP) as indicating that a formulation equivalent to that which the Department of State has indicated is used in Colombia can be acutely toxic to adult frogs and tadpoles at the recommended application rates (1.8 to 5.4 kg/ha). The Agency's tox database cites LC<sub>50</sub> values for two Australian frog species (*Crinia insignifera* and *Litoria moorei*) of 40 and 8 ppm, respectively, presumably from the same studies. Such concentrations are greater than those likely to occur from transport of glyphosate in runoff to ponds. These concentrations might be possible for frogs exposed by direct overspray, such as tree frogs. However, the Agency does not have a method for estimating the possible dietary intake of pesticides for tree frogs; the Agency's model for dietary exposure of terrestrial animals is based on agricultural field data collected in the United States. Extrapolation of toxicity to Australian frog species to Colombian species includes significant uncertainty.

Suggestions of risk to other organisms in Mr. Bigwood's report are less specific. This report states that (t)oxicity of glyphosate formulations in riverine systems is not merely limited to fish, but also to amphibians, insects, crawfish and water fleas, and undoubtedly to other species found in rivers and other bodies of water. This is followed by a discussion of toxicity values for a surfactant other than Cosmo-Flux 411F. As described above, while aquatic exposure to glyphosate itself (or U.S. formulations) is not likely to pose a risk to aquatic animals and plants, data on the toxicity of tank- mix adjuvant Cosmo-Flux 411F to these organisms would be required to assess formulation and tank-mix risks. Tank-mix ecological toxicity data are not routinely provided in the U.S. pesticide registration process.

The Agency would need to obtain and review literature studies cited in Mr. Bigwood's report in order to

comment on other suggested risks. Mr. Bigwood suggests that glyphosate enhances the growth of pathogenic fungi according to several research papers. Based on the titles of the papers, most of the studies cited concern the effect of fusarium fungi on glyphosate efficacy. The Agency cannot comment on the magnitude of this effect without reviewing the data, nor on the potential for risk from this effect. The effects of pesticide applications on microbiota is not a standard component of the Agency's risk assessments.

#### **Incident data**

##### US Incident Data

There are several hundred non-target terrestrial plant incident reports in the Agency's Ecological Incident Information System database connected with the use of glyphosate products. This is consistent with the risk assessment above, which suggests that the efficacy of glyphosate is such that non-target plants hundreds of feet away could be at risk from glyphosate in spray drift. The variety of crops, ornamentals and trees included in the EIIIS reflect the wide spectrum of glyphosate efficacy.

There are a small, limited number of reported incidences to fowl, fish and a dog allegedly resulting from label use of glyphosate products. Further analysis of the data on the actual incidence report forms indicates that other factors or other pesticides may explain the adverse effects. For instance, one incident was apparently due to overstock and improper oxygen levels in a catfish pond, and another to a spill of several barrels of Roundup directly into a creek. Another fish kill was more likely attributable to diuron runoff into a pond than to glyphosate exposure. Although glyphosate was associated with these incidents, the fact that other conditions or pesticides were likely responsible is consistent with the fact that glyphosate has very low mammalian, avian and aquatic acute and chronic toxicity.

Only one incident appears to be attributable to glyphosate, involving 2 iguanas that ate dandelions apparently sprayed with a Roundup product. However, the reptiles exhibited signs of neurological effects (shock, depression and tremor) which are not generally associated with glyphosate toxicity and which may be due to the inert ingredients in the formulation. The Agency does not have any test protocols nor does it require toxicity testing on reptiles for any pesticide. Thus, information on this class of animals in general is an uncertainty.

##### Central and South American Incidents

Mr. Bigwood's report for the Government of Ecuador states that exposure to a dried formulation containing both glyphosate and a surfactant in Roundup (the commercial product being used) caused the death of over 50% of several beneficial insect species. The report does not indicate the level of exposure or the nature of the dried formulation that caused these effects. Therefore, the Agency cannot comment on the relevance of these data to aerial spray of the formulation. Mr. Bigwood cites a Los Angeles Times article in which Guatemalan farmers contend that the discontinued poppy eradication program has devastated the areas traditional agricultural base, particularly tomatoes and bees. Honeybee oral and contact toxicity tests provided to the Agency using technical glyphosate (active ingredient only, not the formulated product) could not establish an LC<sub>50</sub> at concentrations up to 100 micrograms per bee. However, these studies cannot be used to rule out the possible toxicity of the Colombian formulation and tank mix to beneficial insects.

The Amazon Alliance provided the Agency with a list of incidents in Colombia which report adverse effects to crops and domesticated animals from the use of glyphosate on illicit crops. The Agency cannot comment on the reliability of these incident reports, because sufficient information isn't included for each incident. The plant incidents are not inconsistent with the body of plant incidents in the Agency's Ecological Incident Information System database. However, the large animal incidents reported by the Amazon Alliance do not appear to be consistent with glyphosate and glyphosate formulation toxicity data submitted to and reviewed by the Agency.

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## Department of State's Comments on EPA August 19, 2002 Letter

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The Department wishes to respond to three concerns raised by the EPA in its August 19 response to Secretary Powell. First, EPA expressed concern about the level of eye toxicity of the glyphosate formulated product which the Department has been using in the aerial spray program in Colombia (e.g., EPA Response at pp. 2, 33). Secondly, EPA replied that it could not evaluate the toxicity of the tank mixture (glyphosate formulation, water, surfactant) as sprayed in Colombia because the Department did not supply toxicity tests on that mixture (e.g., EPA Response at pp. 2, 33). These two concerns prompted EPA to recommend "that DOS consider using an alternative glyphosate product (with lower potential for acute toxicity) in future coca and/or poppy aerial eradication programs." (EPA Response at p. 12) Finally, EPA raised questions regarding the potential for spray drift to legitimate crops from aerial eradication (e.g., EPA Response at p. 59).

### Glyphosate formulation:

As this report was being prepared, the Department has worked with its supplier of glyphosate to identify a slightly different formulation that is less of an eye irritant because it uses a different inert surfactant. This formulation is also known to have as low or lower toxicity ratings in all other categories as well. Although this alternative formulation has only recently been registered in Colombia, it has been extensively tested and widely used elsewhere, including the U.S., and is registered for non-agricultural use in the U.S. by the EPA.

This alternative formulation addresses EPA's concern in its response to the Department of State. The Department plans to switch to this alternative formulation for use in the aerial spray program in Colombia as soon as the alternative formulation can be manufactured, purchased, and delivered.

### Toxicity tests:

EPA indicated that it could not verify the potential toxicity of the spray mixture: the glyphosate formulation diluted with water and fortified with additional surfactant. The Department has commissioned toxicity tests of the spray mixture being used in Colombia. The most relevant portion of the studies has been completed; it confirms that the risk of eye irritation is low to persons not handling or mixing the concentrated glyphosate formulation. The Department also expects the full tests to demonstrate that this mixture poses no health risk for humans. The EPA-certified laboratory that is performing the studies is doing so in a professional, scientific manner, which has required a considerable amount of time. The results will be forwarded to the Committees, and to the EPA, as soon as the Department receives final copies of the studies.

The Department has also commissioned toxicity tests for the spray mixture using the alternative glyphosate formulation discussed above. These will be performed as soon as that formulation is available for mixing in field conditions.

### Spray drift:

The EPA used a computer model to indicate a possibility that non-target plants hundreds of feet away might be exposed to a fraction of the glyphosate application, depending on spray droplet size and wind conditions. USDA scientists and the Colombian Environmental Auditor to the spray program regularly look for evidence of spray drift as part of ground truth verification missions. These experts, who actually go to the fields, have concluded consistently that evidence of spray drift is rare. Post-spray field visits indicate that if this drift occurs, it is most often in trace amounts that have no observable adverse consequences on non-target plants.

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## Response from Secretary of Agriculture to Secretary of State, August 14, 2002

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USDA

United States Department of Agriculture  
Office of the Secretary  
Washington, D.C. 20250

August 14, 2002

The Honorable Colin. L. Powell  
Secretary of State  
2201 C Street, NW.  
Washington, D.C. 20520

Dear Secretary Powell:

Thank you for your letter of May 8, 2002, requesting that the Department of Agriculture (USDA) advise you regarding the overall safety of the chemicals used in the eradication of illicit narcotic crops in Colombia. This request was made pursuant to the Kenneth M. Ludden Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002, (Pub. L. No. 107-115).

As you are aware, personnel from USDA's Agricultural Research Service (ARS) have provided technical advice to the Department of State regarding environmentally safe narcotic eradication technologies since 1987. This technical advice has primarily been directed to the Department of State's narcotic control programs in Colombia. Pursuant to these eradication activities, a large number of herbicides and adjuvants were screened under laboratory and field conditions. It was determined that glyphosate, applied aurally in a water-based solution, was effective in controlling both illicit poppy and coca. Glyphosate is the most widely used herbicide in the world, available through both commercial and retail distributors. Glyphosate poses minimal health risks to humans and animals, is environmentally benign, and degrades rapidly in soil and water. It is USDA's determination that the risks involved with using glyphosate with commercially available adjuvants for narcotics eradication are minimal. To our knowledge, the only herbicide used by the Department of State for narcotics control is glyphosate.

In addition to providing technical advice regarding the safety of the chemicals involved in the Department of State's eradication program, personnel from ARS actively participate in the verification of both the safety and efficacy of actual eradication efforts in Colombia. To date, no unreasonable risk to non-target plant or animal species have been detected.

Should you wish further information on this subject, please do not hesitate to contact me.

Sincerely,

Ann M. Veneman  
Secretary

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## Letter from Colombian Ambassador to the U.S. Luis Alberto Moreno with Attached Diplomatic Note from the Ministry of Foreign Affairs of the Government of Colombia

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EMBAJADA DE COLOMBIA  
WASHINGTON, D.C.

March 22, 2002

The Honorable  
RANDY BEERS  
Assistant Secretary for International  
Narcotics and Law Enforcement  
U. S. Department of State  
Washington D. C.

Dear Secretary Beers:

I hereby enclose the Verbal Note sent by the Ministry of Foreign Affairs of Colombia to the United States Embassy in Bogota, certifying that our two Governments have been conducting consultations regarding the U.S.-supported aerial coca eradication program in Colombia and that this program is being carried out in accordance with Colombian laws.

Cordially,

LUIS IS ALBERTO MORENO  
Ambassador

---

REPUBLICA DE COLOMBIA  
MINISTERIO DE RELACIONES EXTERIORES

VRE.CEC No. 11355

El Ministerio de Relaciones Exteriores, saluda muy atentamente a la Honorable Embajada de los Estados Unidos de América con ocasión de informar que el Gobierno de Colombia, se encuentra desarrollando el Programa de Erradicación de Cultivos Ilícitos por Aspersión Aérea con el Herbicida Glifosato (PECIG), atendiendo las normas colombianas aplicables en la material.

Que en atención al programa PECIG, viene implementando un plan de manejo ambiental aprobado por el Ministerio del Medio Ambiente, a través de la Resolución No.1065 de 2001 y precisada mediante Resolución No. 0108 de 2002.

Que desde el comienzo del Programa de Erradicación de Cultivos Ilícitos por Aspersión Aérea con el Herbicida Glifosato (PECIG), este ha contado con una auditoria ambiental.

A la Honorable  
EMBAJADA DE ESTADOS UNIDOS DE AMERICA  
Ciudad

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REPUBLICA DE COLOMBIA  
MINISTERIO DE RELACIONES EXTERIORES

En este sentido de acuerdo con las consultas sostenidas entre los Gobiernos de Colombia y los Estados Unidos en asuntos relacionados con la fumigación aérea de cultivos ilegales de coca en Colombia, por este medio el gobierno de Colombia certifica que el programa de fumigación aérea apoyado por los Estados Unidos se está llevando a cabo de acuerdo con todas y cada una de las leyes colombianas aplicables en la materia.

El Ministerio de Relaciones Exteriores se vale de la oportunidad para reiterar a la Honorable Embajada de los Estados Unidos de América las seguridades de su más distinguida consideración.

Bogotá D. C., 21 de marzo de 2002

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U.S. Department of State  
Office of Language Services  
Translating Division

LS No. 07-2002-0012  
KFC/JF  
Spanish

Republic of Colombia  
Ministry of Foreign Relations

VRE.CEC No. 11355

The Ministry of Foreign Relations presents its compliments to the Embassy of the United States and would like to inform it that the Government of Colombia is implementing the Program to Eradicate Illicit Crops by Aerial Spraying of the Herbicide Glyphosate (PECIG), in accordance with applicable Colombian regulations.

Under the PECIG program, an environmental management plan is being implemented that was approved by the Ministry of Environment, through decision No. 1065 of 2001, and outlined further in decision No. 0108 of 2002.

The PECIG program has, moreover, been subject from the outset to an environmental audit.

Embassy of the United States,  
Bogotá.

Therefore, in accordance with the consultations held between the Governments of Colombia and the United States on matters related to the aerial spraying of illegal coca crops in Colombia, the Government of Colombia hereby certifies that the aerial spraying program supported by the United States is being carried out in accordance with each and every applicable Colombian law on the matter.

[Complimentary close.]

Bogotá, March 21, 2002

[Initialed]

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## Aerial Eradication and Alternative Development

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The Kenneth M. Ludden Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002 (P.L. 107-115) (the FY 2002 FOAA) stipulates that

"♦such funds may not be made available for such purposes after six months from the date of enactment of this Act unless alternative development programs have been developed, in consultation with communities and local authorities in the departments in which such aerial fumigation is planned, and in the departments in which such aerial fumigation is has been conducted such programs are being implemented♦"

The attached chart denotes, by department, where aerial spraying of coca has taken place or is anticipated during calendar year 2002. In each of those departments except Antioquia, alternative development programs have been developed in consultation with communities and local authorities in those departments. In the department of Antioquia, the alternative development project is under negotiation. In February 2002 spray planes treated approximately 1,620 hectares of coca in Antioquia. The Embassy and the Colombian National Police have agreed that no further spraying will take place until an alternative development project is being implemented.

The executing agency for each alternative development program is listed in column four. In the departments where the majority of the spraying has taken place in 2002 - Putumayo, Caqueta, Norte de Santander and Nari♦o - multiple alternative development projects are currently being implemented simultaneously.

| Colombia: Aerial Eradication and Alternative Development |                      |                   |                                     |
|--|----------------------|-------------------|-------------------------------------|
| by Department  |                      |                   |                                     |
| <u>Department</u>  | <u>Spraying 2002</u> | <u>AD Program</u> | <u>AD Executing Organization</u>    |
| Amazonas   |                      |                   |                                     |
| Antioquia  | X                    | X                 | PADF                                |
| Arauca   |                      |                   |                                     |
| Atlantico  |                      |                   |                                     |
| Bolivar  | X                    | X                 | PNDA, FIP - "Campo en Accion," PADF |
| Boyaca   |                      |                   |                                     |

|                    |   |   |   |
|--------------------|---|---|---|
| Caldas             |   |   |   |
| Caqueta            | X | X | PNDA, ODCCP, ACDI/VOCA                          |
| Casanare           |   |   |   |
| Cauca              | X | X | PNDA, FIP - "Campo en Accion," ACDI/VOCA        |
| Cesar              | X | X | FIP - "Campo en Accion"                         |
| Choco              |   |   |   |
| Cordoba            | X | X | Red de Solidaridad Social (RSS)                 |
| Cundinamarca       | X | X | FIP - "Campo en Accion" (approved)              |
| Guainia            | X | X | PNDA  |
| Guaviave           | X | X | PNDA  |
| Huila              | X | X | PNDA, ACDI/VOCA                                 |
| La Guajira         |   |   |   |
| Magdalena          |   |   |   |
| Meta               | X | X | PNDA, FIP - "Campo en Accion," ODCCP            |
| Narino             | X | X | PNDA, FIP - "Campo en Accion," ODCCP, ACDI/VOCA |
| Norte de Santander | X | X | PNDA, FIP - "Campo en Accion"                   |
| Putumayo           | X | X | PNDA, FIP - "Campo en Accion," USACE            |
| Quindio            |   |   |   |
| Risaralda          |   |   |   |
| Santander          | X | X | FIP - "Campo en Accion"                         |
| Sucre              |   | X | FIP - "Campo en Accion" (approved)              |
| Tolima             | X | X | PNDA, FIP - "Campo en Accion," ACDI/VOCA        |
| Valle de Cauca     |   | X | FIP - "Campo en Accion" (approved)              |
| Vaupes             |   |   |   |
| Vichada            | X | X | PNDA  |

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
| PNDA (formerly PLANTE): GOC's National Plan of Alternative Development   |  |  |  |
| FIP - "Campo en Accion" (GOC's Popular Investment Fund: "Countryside in Action")   |  |  |  |
| ODCCP (Office of Crime Control and Crime Prevention - formerly UN Drug Control Program): livestock program                             |  |  |  |
| ACDI/VOCA (Agricultural Cooperative Development International/Volunteer Overseas Cooperation in Agriculture): specialty coffee program |  |  |  |
| PADF (Panamerican Development Foundation): income generation program (under negotiation)   |  |  |  |
| USACE (U.S. Army Corps of Engineers): infrastructure development   |  |  |  |

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**Annex 53-B**

**DEPARTMENT OF STATE CERTIFICATION RELATED TO AERIAL ERADICATION IN  
COLOMBIA UNDER THE ANDEAN COUNTERDRUG INITIATIVE SECTION OF THE  
FOREIGN OPERATIONS, EXPORT FINANCING, AND RELATED PROGRAMS APPROPRIATIONS  
ACT, DIVISION E, CONSOLIDATED APPROPRIATION RESOLUTION, 2003**

*(U.S. Department of State)*





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## Certification Related to Aerial Eradication in Colombia Under the Andean Counterdrug Initiative Section of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, Division E, Consolidated Appropriations Resolution, 2003, (P.L. 108-7)

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### Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia

BUREAU OF INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

December 2003

Pursuant to the authority vested in me as Secretary of State, including under the Andean Counterdrug Initiative section of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, Division E, Consolidated Appropriations Resolution, 2003, (P.L. 108-7) (the [FOIA](#)), I hereby determine and certify that: (1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by EPA for this program, and with the Colombian Environmental Management Plan for aerial fumigation; (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks of adverse effects to humans or the environment; (3) complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims; and programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for fumigation.

This Certification shall be published in the Federal Register and copies shall be transmitted to the appropriate committees of Congress.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Colin L. Powell  
Secretary of State

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## Memorandum of Justification Concerning the Aerial Eradication of Coca and Opium Poppy in Colombia

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### Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia

BUREAU OF INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

December 2003

The Andean Counterdrug Initiative section of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, Division E, Consolidated Appropriations Resolution, 2003, (P.L. 108-7) (FOIA) lays out conditions under which assistance using funds appropriated under the FOIA may be made available for the procurement of chemicals for use in aerial eradication of illicit crops. In particular, the FOIA provides:

That not more than 20 percent of the funds appropriated by this Act that are used for the procurement of chemicals for aerial coca and poppy fumigation programs may be made available for such programs unless the Secretary of State, after consultation with the Administrator of the Environmental Protection Agency (EPA), certifies to the Committees on Appropriations that (1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by EPA for this program, and with the Colombian Environmental Management Plan for aerial fumigation; (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks of adverse effects to humans or the environment; (3) complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims; and such funds may not be made available for such purposes unless programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for fumigation.

This memorandum lays out the justification for the Secretary of State's Determination that the conditions in The Andean Counterdrug Initiative section have been met as required.

On April 9, 2003, the Secretary of State wrote U.S. Environmental Protection Agency (EPA) Administrator Whitman to request written consultation concerning the U.S.-supported Colombia eradication program. This letter is included as Attachment 1. Specifically, EPA was asked to advise the Department of State about whether the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by EPA for this program; and about the risks of adverse effects to humans or the environment from the herbicide mixture, in the manner it is being used.

In 2002, EPA provided the Department of State a thorough technical review of the Department of State's glyphosate use in the Government of Colombia's coca spray program. The Department of State and EPA determined that EPA should use the EPA's 2002 analysis as a foundation for the 2003 consultation. The Department's working level consultations with EPA preceded the Secretary's letter and continued into June. The Department met with EPA to brief EPA on changes in the eradication program since the 2002 EPA Analysis and to discuss opium poppy eradication, which Congress did not ask EPA to address in 2002. The Secretary's April 9 letter provided EPA with a written document -- Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program -- that provided further information on the issues discussed in the briefing. This document is included as Attachment 2.

On June 9, EPA Assistant Administrator Stephen Johnson responded to the Secretary of State on behalf of EPA Administrator Whitman with the results of EPA's consultation review. That letter, and the attached document -- Office of Pesticide Programs Details of the 2003 Consultation for the Department of State Use of Pesticide for Coca and Poppy Eradication Program in Colombia -- (EPA 2003 Analysis) are included as Attachment 3.

**1. (A) The herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States**

EPA does not draft the label requirements for pesticide use in the United States, although it reviews and approves recommendations for use that are written by pesticide manufacturers. The aerial spray mixtures currently used in the U.S.-supported program of aerial eradication of both coca and opium poppy in Colombia contain three components: water, an EPA-registered formulation of the herbicide glyphosate, and a surfactant (Cosmo-Flux 411F).

The commercial glyphosate formulation used in the spray mixture is registered with EPA for sale in the United States for non-agricultural use. Although EPA does not regulate the use of adjuvant products not labeled as pesticides, EPA's Office of Pesticide Programs reviewed the complete chemical constituents of Cosmo-Flux 411F, at the request of the Department of State, in 2001. This allowed the Department of State to better assess safety concerns related to the use of this product in the spray program. EPA determined in September 2001 that all of the ingredients of Cosmo-Flux 411F are exempt under 40 CFR 180.1001 from the requirement of tolerances when included in pesticides applied to food, feeds, and livestock.

During 2003 consultations with EPA, the Department of State reported to EPA the breakdown of the spray mixtures used for spraying coca and opium poppy and the application rates used in each operation (Attachment 2, p. 5). EPA responded that EPA has determined that application rates for both coca and opium poppy eradication in Colombia are within the parameters listed on U.S. labels (Attachment 3, Executive Summary). This determination meets the criteria for the Secretary to certify that the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States.

**1. (B) The herbicide mixture is being used in accordance with any additional controls recommended by the EPA for this program**

The Government of Colombia and the Department of State have implemented several changes in the program to address issues raised by the 2002 EPA analysis. For reference, the 2002 EPA analysis, entitled: Office of Pesticide Programs Details of the Consultation for Department of State: Use of Pesticide for Coca Eradication Program in Colombia (2002 EPA Analysis) is enclosed as Attachment 4. The 2002 EPA recommendations and the Department of State responses are outlined below.

**EPA recommendation to change glyphosate product used by the program:**

The EPA made one direct recommendation to the Department of State related to spray program controls in the 2002 EPA Analysis. EPA recommended (Attachment 4, p. 12) that "...due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternative glyphosate product (with lower potential for acute toxicity) in future coca and/or poppy aerial eradication programs. The Department of State believes that this recommendation was meant as a precaution for those persons filling spray tanks on the airplane who risked splashing the full-strength glyphosate into the eyes or onto the skin. The Department of State does not believe that the recommendation was intended to indicate any potential risk to persons exposed to the spray mixture as actually applied by the spray aircraft.

At the time that the EPA made this recommendation, there were no suitable replacement glyphosate formulations registered for sale and use in Colombia that offered lower potential for acute eye irritation. The Department of State worked with the program's glyphosate supplier to identify and to register for sale and use in Colombia a formulation of glyphosate with reduced potential for eye irritation. As soon as that product could be registered for sale and use in Colombia, the Department of State began to purchase it for use in the spray program beginning in September 2002, and it is the formulation used today.

Like the previous formulation, the new formulation is also registered with the EPA for sale in the United States for non-agricultural use. It also contains 41 percent glyphosate salt and 59 percent inert ingredients. Like the previous formulation, the formulation now used is made from a base material (glyphosate technical) that is produced by a manufacturing plant in the United States. The glyphosate formulation now used is mixed with water and surfactant in the same proportions as the previous formulation to form the coca spray mixture.

The difference between the old and new formulations is that the current full strength product has an overall category III toxicological rating (mildly toxic) on the scale used by the EPA, whereas the previously used glyphosate formulation was rated category I (highly toxic) in its full, undiluted strength. The toxicity reduction is due to a change in the surfactant used in the glyphosate formulation. Of course, these ratings refer to the toxicological profile of the glyphosate formulations in their point of sale, undiluted form, and not the spray mixture (water, glyphosate formulation, and surfactant) that exits the spray aircraft.



EPA's 2003 analysis offered the following assessment of the implications of the spray program's switch to the new herbicide formulation for spraying of coca and opium poppy in Colombia: "As for human health concerns, EPA concludes there are no risks of concern from dietary, mixer/loader/applicator or field workers, or bystanders (including children). The concerns for mixer/loader eye irritation discussed in the Agency's 2002 findings have been mitigated by switching to the lower toxicity product" (Attachment 3, Executive Summary, p. ii).

**EPA advice regarding tracking reported health complaints:**

EPA's 2002 analysis (Attachment 4, p. 32) also stated that: "(p)rospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence." The Department of State has increased its efforts to track reported health complaints and to investigate any possible connection between verified spraying of illicit crops and damages purported in any such complaints.

The spray program tracks human health complaints in several ways. The first is to initiate an immediate investigation, often including clinical evaluation of the patient(s), upon notice to the U.S. Embassy of a problem. The Embassy's Narcotics Affairs Section (NAS) learns about cases through letters directed to the Embassy or Government of Colombia (GOC) entities, from local counternarcotics base commanders, from the members of the media, and from non-governmental organizations. To investigate complaints of toxic exposure allegedly caused by spraying, NAS retains the services of two of Colombia's leading toxicologists, including the director of Colombia's national poison control center, the Uribe Culla Centro de Asesoramiento Toxicológico.

Since submission to Congress of the FY 2002 "Report on Issues Related to the Eradication of Illicit Coca in Colombia," four such complaints have been reported to the U.S. Embassy. Details of these complaints and of follow-up medical evaluations are included below.

In September 2002, the Embassy received a complaint of multiple cases of poisoning from spraying of coca in Puerto Asís (Putumayo Department). A visit to the hospital and interviews with doctors there by a Colombian toxicologist under contract to the State Department revealed no cases of poisoning or illness attributable to spray chemicals. The toxicologist learned of two hospitalized children who could have been the source of the complaint, and he reviewed their cases. One of those children was suffering from poisoning by an organophosphate insecticide. The other child was suffering from asthma. An English language version of the toxicologist's report from this investigation is enclosed as Attachment 2, Tab B.

In February 2003, a news report in the Bogotá daily "El Tiempo" attributed the spread of tuberculosis and cases of harelip and cleft palate in newborns to aerial spraying of coca in Tibú (Norte de Santander department). A toxicological review (Attachment 5) showed cleft palate and harelip to be genetically inherited defects that have never been reported in humans as a result of exposure to any chemical substance. Tuberculosis is an infectious disease passed from person to person, and is also unrelated to any potential exposure to spray chemicals.

During a March 2003 visit to Pasto, Nariño, Embassy Public Affairs personnel were told that the local hospital had cases of children suffering health problems from spraying. A NAS officer followed up on this case and spoke with a hospital doctor who explained that there were no sick children in the hospital, but that he was tracking a number of children with birth defects whose mothers allegedly were exposed to spray chemicals. The doctor offered to let an Embassy-contracted Colombian toxicologist review the case files. A NAS letter to file regarding this case is enclosed as Attachment 6.

On July 2, 2003, a news broadcast on Caracol TV reported the death of a coca leaf harvester allegedly exposed to spray chemicals. The man had been hospitalized in San Pablo, Bolívar department. Investigation revealed that the man suffered a serious infectious disease that went undiagnosed until it was too late. Officials in San Pablo eventually transferred the man to a better-equipped hospital in Bucaramanga, Santander department, where he later died. An autopsy confirmed that the man had died from pneumonia and meningial infection. A screen for chemicals in his lung tissue was negative. The toxicologist's report from this investigation is enclosed as Attachment 7.

The Government of Colombia and the U.S. Embassy Bogotá have also taken a proactive approach to investigating human health concerns manifest in areas where the spraying takes place. Both governments have collaborated to create a robust Medical Civic Action Program (Medcap) to search out cases of harm to health allegedly caused by the spraying. These public health interventions are timed to take place in areas where coca eradication has recently taken place. U.S. Embassy-contracted Colombian toxicologists talk to patients as well as to local medical personnel, looking for spray-related cases. As outlined in the chart below, a total of 4,779 patients made themselves available for Medcap medical personnel, had their medical conditions assessed, and received complimentary health care. Although Medcap personnel have encountered cases that were claimed to

be spray-related, their reviews of these cases have determined that, in each case, the conditions were caused by events unrelated to aerial eradication. Through Medcap and other medical investigations, the U.S. Embassy has still not yet found a single instance of spray-related harm to human health. (Note: This is an ongoing program and several Medcaps are planned for upcoming months).

| Place and Date                | Patients Assessed |
|-------------------------------|-------------------|
| Cartagena del Chair (Caquet)  | 250               |
| May 11, 2002                  |                   |
| Solano (Caquet)               | 120               |
| August 7, 2002                |                   |
| Santa Ana (Putumayo)          | 260               |
| September 21, 2002            |                   |
| Puerto As (Putumayo)          | 250               |
| November 9, 2002              |                   |
| San Vicente del Cagu (Caquet) | 149               |
| February 1, 2003              |                   |
| Morelia (Caquet)              | 250               |
| July 20, 2003                 |                   |
| Florencia (Caquet)            | 3,500             |
| September 18-21, 2003         |                   |

Additionally, NAS is collaborating with the Colombian National Institute of Health (INS) on a program to identify health effects of herbicides and pesticides, including glyphosate, in populations located in coca growing regions across Colombia. A NAS-contracted toxicologist helped INS prepare and conduct training for physicians and environmental health personnel who serve the populations of these areas.

The training consists of a weeklong workshop that covers toxicology, classification of pesticides, prevention, diagnosis and recognition of pesticide poisoning, clinical management, epidemiological considerations and procedures for the study of an outbreak, glyphosate toxicological facts, and a risk assessment of aerial application of glyphosate for people and the environment. Two such workshops have been completed:

| Place and Date         | Attendees                       |
|------------------------|---------------------------------|
| Pasto (Nari)           | 32 physicians<br>31 technicians |
| September 1-5, 2003    |                                 |
| Puerto As (Putumayo)   | 28 physicians<br>26 technicians |
| October 20 to 24, 2003 |                                 |

Another workshop was held in Neiva, Huila from December 1-5, 2003, for public health personnel in the Huila and Tolima opium poppy growing regions. Some 60 physicians and 55 environmental health technicians were expected to attend. Four more workshops are scheduled for the first quarter of 2004 in Meta-Guaviare, Arauca, North Antioquia, and Santander/South of Bolivar.

The EPA 2003 Analysis reported that the Government of Colombia and the U.S. Embassy Bogota have adhered to the EPA advice on tracking and investigating health complaints (Attachment 3, p. 30). The EPA 2003 Analysis also made new health tracking recommendations: (EPA) requests that Department of State improve its definition of glyphosate poisoning, provide further documentation of its investigations and how they are conducted, and standardize data collection (Attachment 3, Executive Summary, p. ii).

The Department and the Government of Colombia are currently implementing the 2003 EPA recommendations. NAS Bogota and the Government of Colombia's (GOC's) National Institute of Health have developed and distributed standardized data collection worksheets and a definition of glyphosate poisoning in the workshops referenced above.

**EPA comment regarding spray drift:**

Although not addressed to the Department of State as a recommendation, EPA also noted in its consultation with the Department of State some concern regarding spray drift and the potential for non-targeted, desirable vegetation to suffer from the spraying of nearby coca (or opium poppy). Informed of EPA and Congressional concern, the Department of State and the Government of Colombia have incorporated several measures into the spray program to assist with evaluation and control of spray drift.

The first of these steps was to reinforce the environmental safety component of spray pilot training. A NAS Environmental Advisor and aviation experts from the Department of State's Air Wing designed a curriculum for pilots on the potential negative impact that spraying may have on the environment and techniques to minimize potential collateral damage to legal crops and the environment.

Pilots received this briefing in December 2002 and again in June 2003. All pilots, both fixed wing spray pilots and rotary wing escort helicopter pilots, will receive these briefings, which will be conducted semi-annually (a third session is on track for December 2003). Briefings emphasize the unique aspects of the Colombian operational theatre, and will solicit feedback from pilots on techniques to maximize application effectiveness and avoid damage to non-target vegetation. An outline of this briefing is included as Attachment 2, Tab C.

Search and rescue helicopter crews that accompany each spray flight have also been directed to monitor drift patterns from above. They now assist in ensuring that spray does not drift beyond target crops and notify the spray aircraft flight lead when conditions might merit canceling a spray flight. A copy of the directive from the Department of State's Bureau of International Narcotics and Law Enforcement Affairs (INL) Office of Aviation to the eradication contractor that formalizes these new spray regulations is included as Attachment 2, Tab D.

EPA noted in 2003 that the Agency believes that the potential for spray drift phytotoxicity is still a factor for both coca and poppy spraying. EPA recognizes that the Department of State is employing Best Management Practices to minimize drift and encourages them to continue these efforts. (Attachment 3, Executive Summary, p. ii).

The Department will continue drift control efforts as EPA recommends. Based on responses to EPA's 2002 and 2003 recommendations on herbicide use, human health tracking, and spray drift, the Department of State believes that the herbicide mixture is being used in accordance with any additional controls recommended by the EPA for this program.

#### **1. (C) The herbicide mixture is being used in accordance with the Colombian Environmental Management Plan for aerial fumigation**

The GOC's Environmental Management Plan for aerial eradication (EMP) was drafted and implemented by the Ministry of the Environment (MINAMB) in 2001. The EMP was designed to be a living document, and it was modified by several MINAMB resolutions at the end of the previous administration. As written, the EMP was impossible to execute and lacked clear lines of responsibility for the GOC line agencies that were required to carry out aspects of the EMP.

In 2003, the GOC recognized that further refinement was necessary to achieve greater efficiencies, and formed an inter-institutional technical committee to revise the EMP. This committee, which first met on May 8, 2003, was composed of representatives from the Ministry of the Environment (MINAMB), the National Directorate for Dangerous Drugs (DNE), the Antinarcotics Police (DIRAN), the Ministry of Health, the Ministry of Agriculture (ICA), MINAMB's laboratory (IDEAM), and the U.S. Embassy Bogota Narcotics Affairs Section (NAS).

The revisions recommended by the committee were briefed to Colombian environmental groups following formal publication. After a fifteen-day period, during which no adverse comments were received, the revisions were incorporated into the EMP by MINAMB Resolution 1054 on September 30, 2003. An English language version of the revised EMP is enclosed as Attachment 8.

The most significant change in the EMP is the inclusion of multiple agencies in the monitoring process. Under the EMP as modified, environmental monitoring is an inter-agency process, with clear roles and responsibilities for each party. INL technical and equipment assistance provided to a wide range of EMP participants has given these agencies an ability to actively participate in monitoring of the spray program and to carry out the roles required of them. With Department of State-donated laboratory equipment, the GOC Institute of Geography will conduct soil sampling and the Ministry of Health will conduct water sampling to determine the persistence of glyphosate in sprayed areas. Similarly, with assistance from the Department of State, the GOC's Ministry of Health is training health care providers in areas where spraying takes place to recognize different forms of chemical poisoning. Once trained, they will be able to differentiate between glyphosate-derived illness and the other forms of chemical poisoning that commonly afflict people who process raw materials into finished drugs in their homes. NAS has allocated \$3 million from the eradication budget for environmental improvements ranging from physical upgrades at bases to the provision of training and equipment to GOC line agencies for EMP purposes.

INL Principal Deputy Assistant Secretary Paul Simons visited Bogota during November 5-7 to meet with NAS Bogota and participating GOC EMP agencies to discuss their roles under the new EMP. All of these agencies were appreciative of the Department of State's assistance that is now allowing them a seat at the table under a functioning EMP. In addition to providing assistance to Colombia's EMP agencies, NAS Bogota has hired four personnel to strengthen oversight of the eradication program and related initiatives to ensure continued

compliance with environmental guidelines, including the EMP. The added positions include a U.S. contractor Environmental Advisor, a Colombian Environmental Advisor, and a Colombian lawyer to assist with complaint investigations and adjudication, and a Colombian toxicologist.

Due to the limited time between the approval of the modifications to the EMP (September 30) and the submission of this report, INL has been unable to fully comply with one provision. This provision (Attachment 8, specification No. 4), calls for sewage and industrial wastewater treatment facilities to be installed at all aerial eradication forward operating locations (FOLs). NAS Bogota has designed and ordered the necessary equipment, but there will be some lag time pending delivery and installation. This is inevitable, as spraying moves into new areas and new FOLs are developed. Although this aspect of the EMP has not been completed, we believe that in progress implementation of the program complies with both the spirit and the letter of the EMP sufficiently so that the Secretary's certification is appropriate at this time.

Attachment 9 is a letter dated November 5 from the Government of Colombia's Vice Minister of Environment certifying that the spray program is being carried out in compliance with the Government of Colombia's Environmental Management Plan. The Government of Colombia's Environmental Ministry has over-arching responsibility for supervision of the Environmental Management Plan.

## **2. The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment**

The Secretary of State certified last year that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. Since the 2002 certification, the Department has responded to EPA recommendations (per the above) with adjustments that have strengthened spray program controls and ensure increased protection against adverse effects to humans and the environment.

After consultations with the Department of State in 2003, EPA offered the following assessment of human health concerns related to the spraying of coca and opium poppy in Colombia: As for human health concerns, EPA concludes there are no risks of concern from dietary, mixer/loader/applicator or field workers, or bystanders (including children). The concerns for mixer/loader eye irritation discussed in the Agency's 2002 findings have been mitigated by switching to the lower toxicity product (Attachment 3, Executive Summary, p. ii).

EPA also concluded that the eradication program lowered its potential risks to wildlife and takes appropriate measures to minimize off target drift: EPA concludes that the switch to a lower toxicity product will pose less risk of acute poisoning to wildlife. The Agency believes that the potential for spray drift phytotoxicity is still a factor for both coca and poppy spraying. EPA recognizes that the Department of State is employing Best Management Practices to minimize drift and encourages them to continue these efforts. (Attachment 3, Executive Summary, p. ii).

The Department of State believes that improvements over the last year have decreased the likelihood of adverse impacts of eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

## **3. (A) Complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims**

On October 4, 2001, the GOC formally instituted a new process to compensate growers for legal crops sprayed in error. Since that date, the Government of Colombia's National Directorate of Dangerous Drugs (DNE), the Government of Colombia agency responsible for complaint investigations, has received 4,329 complaints. Five of these complaints have been found to be valid and a total of 52 million pesos (\$18,400 dollars) in compensation has been paid for damages to legal crops.

63 percent of these complaints (2,740) have been investigated and denied as not being valid cases. Of this group, 44 percent (1,200 complaints) were verified in the field and the crop in question was found to be coca or to be interspersed with coca and thus ineligible for compensation. 52 percent (1,425) of the rejected complaints were denied because there was no spraying in the area during the time frame of the complaint (the complainant is given the benefit of the doubt with a calendar day on either side of the day cited in his/her complaint). Three percent (89) of the rejected complaints were denied because they were filed more than two months after the alleged spraying. The remaining one percent (26) of the cases was closed because the request for additional information from the complainant was not returned within 60 days (the time allotted for any request for more information in a Colombian judicial process).

Although almost two thirds of the filed complaints have been closed, 37 percent (1,584) are being processed and verified. Complaints resolution is a rolling process; on-site investigations continue and compensation is being paid to cases with merit.

Field verification is extremely dangerous and resource intensive and this is a slow-moving process. Because of the risks involved for the Embassy personnel, agronomists, lawyers, DNE representatives, CNP officials, and ombudsman's representatives that accompany site visits, the primacy of security will dictate the pace of investigations in the future. Although logistical considerations (security concerns, personnel availability, and helicopter resources) are part of the reason that complaints cannot be resolved in the field more quickly, the greatest logjam in this system is the number of false complaints that overwhelm the ability of field investigators to close more cases.

False complaints ♦ cases in which growers complained that their legitimate crops were sprayed, but investigators who reached the fields in question found them to be coca or legitimate crops interspersed with coca ♦ waste resources that otherwise might be used in the service of the farmers who really deserve compensation. Of the 1,200 complaints investigated in the field, only five have been deemed credible. In other words, less than half of one percent of the cases that have been visited by complaint verification teams to date have merited compensation. Nevertheless, Embassy Bogota has taken steps to make sure that the complaint resolution is swifter and continues to pursue field verifications when security, weather, and logistical considerations permit.

The Colombian Ministry of Justice is in the process of refining the claims procedures to further streamline the process. These will include a warning that a complainant found to have coca growing in fields that he claims were legal crops will be subject to prosecution under violation of a Colombian law prohibiting false claims. Presumably, this will deter the overwhelming number of false claims that have flooded the system, making investigation of and restitution for genuine claims very difficult.

**3. (B) Such funds may not be made available for such purposes unless programs are being implemented by the USAID, the GOC, or other organizations in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for spraying**

Thus far in calendar year 2003, the Colombian aerial eradication program has sprayed coca in the departments of Putumayo, Nariño, Guaviare, Meta, Bolivar, Cauca, Norte de Santander, Vichada, Antioquia, Vaupes, Cordoba, and Arauca and opium poppy in the departments of Cauca, Huila, Tolima, Nariño, Cesar, and La Guajira. In each of these areas, USAID, the GOC, and/or other organizations are implementing alternative development programs to provide legal income generating opportunities to illicit crop growers who agree to accept benefits after eradicating their crops of coca or opium poppy.

For the purposes of this report, the Department of State interprets the term ♦area♦ as a Colombian department. This is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components should not always be implemented in every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca and opium poppy are often grown in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than illegal merchandise. Dispersing development activities to remote areas raises costs while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils, inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of Public Law 108-7, guerilla and paramilitary groups operate in many illicit crop-growing zones and make alternative development inadvisable in these locations. These narcoterrorist groups reap immense profit from the illegal trade and pose grave security risks for development personnel and slow down the implementation progress.

Despite these obstacles to alternative development in Colombia, USAID and the GOC are implementing a robust alternative development program in coca and opium producing areas. Now in the fourth year of Plan Colombia alternative development coordination with the GOC and the third year of project implementation, USAID's alternative development (AD) program has supported a total of 24,549 hectares of licit crops and completed 260 infrastructure projects in coca and poppy growing areas through March 31, 2003. These efforts have benefited a total of 22,829 families. These achievements in each category have surpassed program goals. Equally important, USAID has strengthened a total of 30 NGOs, cooperatives, and national institutions so that alternative development and community building activities will be more sustainable.

The alternative development projects being carried out by USAID and GOC organizations in each area where the spray program eradicates illicit crops are described below.

**Antioquia**

A \$9.1 million project through the Pan-American Development Foundation (PADF) for short-term production

activities for immediate income and employment needs; longer term crops such as natural rubber and cacao to provide sustainability; and complementary productive infrastructure. Also operating in south of Bolivar Department.

A \$8.5 million project through Land O'Lakes (LOL) to promote sustainable dairy production, processing and marketing involving small farmers. Also operating in Nariño.

Aid to Artisans (ATA) is carrying out a \$4.3 million project to strengthen local capacity for production and marketing of crafts. Also operating in Atlantico, Boyaca, Caldas, Cauca, Cesar, Codoba, Huila, Magdalena, Narino, Quindio, Santander, Sucre, and Tolima.

The \$20 million Colombia Agribusiness Partnership Program (CAPP), implemented by Associates in Rural Development (ARD) is promoting private sector agricultural production. In Antioquia, the program supports small farmers in producing fruit for processing into pulp and African palm. Also operates in Atlantico, Bolivar, Caldas, Casanare, Cauca, Cesar, Cordoba, Guajira, Huila, Magdalena, Narino, Quindio, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

The \$12 million Colombia Enterprise Development (CED) project to support small and medium enterprise development in secondary cities. Also operating in Atlantico, Caldas, Quindio, Risaralda, Santander, Valle del Cauca, and Tolima.

The \$22.7 million Colombia Forestry Development Project (CFDP) to support: forest policy changes and improved production, processing and marketing of forest and wood products to increase incomes. Will also operate in Choco, Magdalena, and Narino.

The Colombian Government's Investment Fund for Peace (FIP), a \$32.2 million investment, is generating employment through infrastructures, licit crop production (coffee rehabilitation, agro forestry), skills training, and education/nutrition aid to poor families.

#### **Arauca**

The \$2.4 million effort under the GOC's FIP generates employment through infrastructure and road improvements, equipment and infrastructure for local government and community organizations, and education/nutrition assistance to poor families.

#### **Bolivar**

PADF is supporting short cycle production activities to address immediate income and employment requirements; longer term crops such as natural rubber and cacao to provide sustainability; and complementary productive infrastructure.

CAPP is also promoting private sector involvement with farmers to produce cacao, African palm, and yucca (cassava).

The GOC's FIP is also active in Bolivar providing \$12.8 million for employment generation activities through infrastructure and road improvement projects, licit crop production (rubber, reforestation, corn, beans), equipment and infrastructure for local governments and community organizations, skills training, forest guardian families program, and education/nutrition assistance to poor families.

#### **Caqueta**

Chemonics -- Colombia Alternative Development (CAD) project is investing \$4.5 million and fostering short-term crop production for food security and longer-term income generation through rubber production.

The Amazon Conservation Team is assisting Colombian indigenous communities in food security, health and local governance/land management (total investment \$1.8 million). Activities under this program are also being carried out in the Departments of Putumayo and Vaupes.

The GOC's FIP is supporting employment generation activities through infrastructure and road improvement projects, licit crop production (coffee rehabilitation, sugarcane, rubber planters, livestock), equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families with resources amounting to \$2.0 million.

#### **Cauca**

Chemonics-CAD activities, totaling \$3.9 million, to improve forest management/production, processing and marketing chains as well as supporting small scale irrigation for the production and marketing of short-season, high-value crops.

ACDI/VOCA is also promoting specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The CAPP project is supporting private sector investments in hot peppers, jute, and cacao.

Aid to Artisans project is enhancing local capacity for production and marketing of crafts as licit income generating alternatives.

The GOC's FIP is supporting employment generation activities through infrastructure and road improvement projects, licit crop production (coffee rehabilitation, fruit trees, forestry, yucca, vegetables, and livestock), equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families with resources totaling \$8.6 million.

### **Cesar**

Aid to Artisans project is carrying out activities to strengthen the production and marketing of crafts.

The ARD/CAPP program is supporting private sector investments with small farmers producing crops such as cacao, fruits and African palm.

The GOC's FIP is supporting employment generation activities through infrastructure and road improvement projects, licit crop production (cacao, coffee rehabilitation, forestry), equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families totaling \$3.8 million.

### **Cordoba**

Aid to Artisans project is supporting the strengthening of local capacity to produce and market crafts by artisans in the Department.

ARD/CAPP program is supporting private sector activities in cacao and passion fruit production.

The GOC's FIP is providing \$8.6 million for employment generation activities involving road improvement projects, and education/nutrition assistance to poor families.

### **La Guajira**

The CAPP is supporting private sector activities in crops such as passion fruit and cacao.

The GOC's FIP is providing \$0.7 million to support employment generation through infrastructure activities, equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families.

### **Guaviare**

The GOC's FIP is providing \$0.8 million to support employment generation activities through road improvement projects. A FIP road improvement program involving Guaviare and Meta is providing \$3.4 million for the two departments.

### **Huila**

Chemonics - CAD project is supporting a \$0.6 million activity to promote production and marketing of passion fruit.

ACDI/VOCA is promoting specialty coffee production, processing and marketing in poppy growing areas.

ARD/CAPP is supporting cacao and fruits production.

The Aid to Artisans project is promoting production and marketing of crafts.

The GOC's FIP is supporting employment generation activities through road improvement projects, equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families with \$7.5 million in GOC resources.

#### **Meta**

The GOC's FIP is supporting employment generation activities through infrastructure and road improvement projects, equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families totaling \$3.6 million. In addition, a road improvement program involving Guaviare and Meta is providing \$3.4 million to the two departments.

The ARD/CAPP program is promoting private sector investments with small farmers to produce African palm.

#### **Nariño**

ACDI/VOCA is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Narino.

The United Nations Office on Drugs and Crime (UNODC) is implementing a \$1.2 million activity to encourage annual crops, agro forestry, and dual purpose livestock production. An agro-forestry management activity totaling \$1.8 million is scheduled to begin in December.

Land O'Lakes is promoting sustainable small farm dairy production, processing and marketing.

ARD/CAPP program is supporting small farmer, private sector projects in cacao and African palm production.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in Narino.

The \$22.7 million Chemonics Colombia Forestry Development Project will be supporting forest policy changes and carry out activities for the improved production, processing and marketing of forest and wood products in Narino as well as in Antioquia, Choco and Magdalena.

The GOC's FIP is supporting employment generation activities through infrastructure and road improvement projects, support for licit crop production (coffee rehabilitation, fruit trees, corn, beans), equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families with resources totaling \$8.2 million.

#### **Norte de Santander**

A Chemonics-CAD \$6.4 million activity in cooperation with FIP is promoting cacao and African palm production, processing and marketing.

The GOC's FIP is supporting employment generation activities through road improvement projects, licit crop production (rubber, cacao, plantains), equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families totaling \$6.0 million.

#### **Putumayo**

Chemonics-CAD project is providing \$44.7 million in Putumayo for: short and medium-term crop production with farmers and indigenous groups, hearts of palm production, processing and marketing; rubber production, processing and marketing; forest management and value added processing and utilization of forest and wood products; infrastructure projects, including bridge construction and road improvements, schools, and health facilities. As part of the development of production and marketing chains, support is being provided for the private sector involvement in processing plants and marketing for cassava chips, black pepper and plantain; tropical flowers and foliage, vanilla production, as well as for medicinal plants and essential oils.

The U.S. Army Corp of Engineers' \$6.7 million rural infrastructure project is carrying out road, sewage and water treatment activities that are generating employment.

The Amazon Conservation Team's \$1.8 million project is supporting Colombian indigenous communities in food security, health and local governance/land management.

The GOC's FIP also supports employment generation activities through infrastructure and road improvement projects, the forest guardian families program, equipment and infrastructure for local governments and



community organizations, and education/nutrition assistance to poor families totaling \$8.5 million.

**Tolima**

Chemonics-CAD project is supporting a \$1.1 million activity to increase annual crop production for food security and to increase income and employment generation in the longer term through forestry, livestock and cold climate fruit production.

ACDI/VOCA is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

The \$12.0 million Colombia Enterprise Development project implemented by CARANA Corporation will be supporting small and medium enterprise development in Colombia's secondary cities including those in Tolima.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in the Department.

ARD/CAPP is supporting private sector projects in fruits and cacao production.

The GOC's FIP is supporting the forest guardian families program, equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families with resources totaling \$10.2 million.

**Vaupes**

The Amazon Conservation Team's project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

**Vichada**

The GOC's FIP is providing \$200,000 in employment generation activities through infrastructure projects, equipment and infrastructure for local governments and community organizations, and education/nutrition assistance to poor families.

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## Updated Report on Chemicals Used in the Colombian Aerial Eradication Program

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### Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia

BUREAU OF INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

December 2003

On September 4, 2002, the Department of State submitted to Congress the Secretary of State's determination and report to Congress on issues related to the eradication of illicit coca in Colombia in accordance with the FY 2002 Foreign Operations, Export Financing, and Related Programs Appropriations Act (P.L. 107-115). That document contained an explanation of the chemicals and methods used for the eradication of coca in Colombia and the safeguards in place to minimize the risk of harm to human health and the environment. It also contained the results of the Department of State's consultations with the United States Environmental Protection Agency (EPA), including EPA's analysis of the risks to human health and the environment that might be posed by coca eradication.

The Government of Colombia and the Department of State have implemented several changes in the program to address concerns raised by the EPA analysis. The first section of this document reviews the Department of State response to EPA's 2002 recommendation for additional controls for the spray program. Sections two and three explain the changes introduced by the Government of Colombia and the Department of State to respond to EPA and Congressional concerns about other aspects of aerial eradication in Colombia. A fourth section describes the changes in chemical composition and spraying methods since the Department of State's 2002 report. The final section reviews the chemicals and methods used for opium poppy eradication in Colombia, a part of the program that Congress did not ask the Department of State or EPA to address in FY 2002.

#### 1. EPA Recommendation to Change Glyphosate Product Used by the Program

The EPA made one direct recommendation to the Department of State related to spray program controls in its Office of Pesticide Programs Details of the Consultation for Department of State: Use of Pesticide for Coca Eradication Program in Colombia. On page 12 of that document, EPA recommended that due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternative glyphosate product (with lower potential for acute toxicity) in future coca and/or poppy aerial eradication programs. This was addressed to the possible risk of splashing the full-strength glyphosate into the eyes or onto the skin of persons filling the spray tanks on the airplane. It was not directed at potential risk to persons exposed to the spray mixture as actually applied by the planes.

At the time that EPA made this recommendation, there were no suitable replacement glyphosate formulations registered for sale and use in Colombia that offered lower potential for acute eye irritation. The Department of State worked with the program's glyphosate supplier to identify and to register for sale and use in Colombia a formulation of glyphosate with reduced potential for eye irritation. As soon as that product could be registered for sale and use in Colombia, the Department of State began to purchase it for use in the spray program and it remains the formulation used today.

Like the previous formulation, the new formulation is also registered with the EPA for sale in the United States for non-agricultural use. It also contains 41 percent glyphosate salt and 59 percent inert ingredients. Like the previous formulation, the formulation now used is made from a base material (glyphosate technical) that is produced by a manufacturing plant that is registered in the United States even though the formulation is produced and sold in Colombia. The glyphosate formulation now used is mixed with water and surfactant in the same proportions as the previous formulation to form the coca spray mixture.

The difference between the formulations is that the current product has an overall category III toxicological rating (mildly toxic) on the scale used by the EPA, whereas the previously used glyphosate formulation was rated category I (highly toxic). The toxicity reduction is due to a change in the surfactant used in the glyphosate formulation. Of course, these ratings refer to the toxicological profile of the glyphosate formulations in their point of sale, undiluted form, and not the spray mixture (water, glyphosate formulation, and surfactant) that exits the spray aircraft.

The Department of State took these steps in part to address public concerns about the toxicity of the spray mixture and allegations that the combination of glyphosate and surfactant would pose a threat to human and environmental health. In that regard, the Department of State also contracted with an independent United States laboratory to determine the toxicity of the spray mixture (e.g., the glyphosate formulation with water and surfactant added), exactly as it is mixed in the field. Because final drafts of those toxicology tests were not completed in time for EPA's assessment in 2002, copies of the toxicology tests on the spray mixture currently used for coca eradication are enclosed as Attachment A. These tests show that the spray mixture rates a category III (mildly toxic) for eye irritation and category IV, or slightly toxic, in all other categories (e.g., acute oral, acute dermal, acute inhalation, skin irritation, sensitization).

## 2. EPA Advice Regarding Tracking Reported Health Complaints

EPA's Office of Pesticide Programs Details of the Consultation for Department of State: Use of Pesticide for Coca Eradication Program in Colombia also advised (on page 32) that: (p)rospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence. Although this recommendation is not related to spray program controls, the Department of State has increased its efforts to track reported health complaints and to investigate any possible connection between any such complaints and the eradication of illicit crops.

The spray program tracks human health complaints in two ways. The first is to initiate an immediate investigation, often including clinical evaluation of the patient(s), upon notice to the U.S. Embassy of a problem. The Embassy's Narcotics Affairs Section (NAS) learns about cases through letters directed to the Embassy or GOC entities, from local counternarcotics base commanders, and from the members of the media. To investigate complaints of toxic exposure allegedly caused by spraying, NAS retains the services of two of Colombia's leading toxicologists, including the director of Colombia's national poison control center, the Uribe Cualla Centro de Asesoramiento Toxicológico.

Since submission to Congress of the FY2002 Report on Issues Related to the Eradication of Illicit Coca in Colombia, two such complaints have been reported to the U.S. Embassy. In September 2002, the Embassy received a complaint of multiple cases of poisoning from spraying of coca in Puerto As (Putumayo department). A visit to the hospital and interviews with doctors there revealed no cases of poisoning or illness attributable to spray chemicals. The toxicologist learned of two hospitalized children who could have been the source of the complaint, and he reviewed their cases. One of those children was suffering from poisoning by an organophosphate insecticide. The other child was suffering from asthma. An English language version of the toxicologist's report from this investigation is enclosed as Attachment B.

In February 2003, a news report in the Bogotá daily *El Tiempo* attributed the spread of tuberculosis and cases of harelip and cleft palate in newborns to aerial spraying of coca in Tib (Norte de Santander department). A toxicological review showed cleft palate and harelip to be a genetically inherited defect that has never been reported in humans as a result of exposure to any chemical substance. Tuberculosis is an infectious disease passed from person to person, and is also unrelated to any potential exposure to spray chemicals.

The Government of Colombia and the U.S. Embassy Bogotá have also taken a proactive approach to investigating any human health concerns manifest in areas where the spraying takes place. Both governments have collaborated to create a robust Medical Civic Action Program (Medcap) to search out cases of harm to health allegedly caused by the spraying. During these public health interventions that are timed to take place in areas where coca eradication has recently taken place, U.S. Embassy-contracted toxicologists talk to patients and talk to local medical personnel, looking for spray-related cases. As outlined in the chart below, a total of 1,029 patients made themselves available for Medcap medical personnel, had their medical conditions assessed, and received complimentary health care. Although Medcap personnel have encountered cases that were claimed to be spray-related, reviews of these cases have determined that events unrelated to eradication spraying had caused them. Through Medcap and other medical investigations, the U.S. Embassy has never found an instance of spray-related harm to human health. This is an ongoing program and the next Medcap is planned for the end of April in Caquet, a few weeks into the spray campaign in that region.

| Place and Date                                       | Patients Assessed |
|--|-------------------|
| Cartagena del Chair<br>(Caquet)<br>May 11, 2002      | 250               |
| Solano (Caquet)<br>August 7, 2002                    | 120               |
| Santa Ana (Putumayo)<br>September 21, 2002           | 260               |
| Puerto As (Putumayo)<br>November 9, 2002             | 250               |
| San Vicente del Cagu<br>(Caquet)<br>February 1, 2003 | 149               |

To further address public and Congressional concerns about the possibility of human health and environmental harm potentially caused by spraying, the Department of State is working with the Government of Colombia and Garzon Ingenieros Asociados Ltda, an accredited Colombian laboratory, to analyze water taken from areas where the spray program operates. Technology for monitoring soil is not available in Colombia, so the Department of State is working with the Government of Colombia and the U.S. Department of Agriculture Agricultural Research Service to analyze soil samples at the USDA/ARS laboratory at the University of Mississippi. The Department of State is paying for technicians from two Colombian government laboratories and the Ministry of the Environment to travel to Mississippi in April to learn how to perform the analysis. The soil and water analyses will determine the degree of persistence of glyphosate and its byproducts in Colombian soil and water, in the unlikely event there is something unique about Colombian soil and water that would invalidate the many studies done on the residual effects of glyphosate in other parts of the world. The Department of State, the Government of Colombia and a private Colombian university (Universidad de Los Andes) are developing demonstration plots in the five distinct environmental regions of the country to study glyphosate persistence and the regeneration of natural vegetation and other ecological dynamics following aerial eradication of illicit crops.

### 3. EPA Comment Regarding Spray Drift

Although not addressed to the Department of State as a recommendation, EPA also noted in its consultation with the Department of State some concern for spray drift and the potential for non-targeted, desirable vegetation to suffer from the spraying of nearby coca (or opium poppy). Informed of EPA's and Congressional concern, the Department of State and the Government of Colombia have incorporated several measures into the spray program to assist us with evaluation and control of spray drift.

The first of these steps was to reinforce the environmental safety component of spray pilot training. All pilots, both fixed wing spray pilots and rotary wing escort helicopter pilots, will receive briefings on the potential negative impact that spraying may have on the environment and techniques to minimize potential collateral damage to legal crops and the environment. These briefings will be conducted semi-annually, will emphasize the unique aspects of the Colombian operational theatre, and will solicit feedback from pilots on techniques to maximize application effectiveness and avoid damage to non-target vegetation. An outline of this briefing is included as Attachment C. Search and rescue helicopter crews that accompany each spray flight have also been directed to monitor drift patterns from above. They now assist in ensuring that spray does not drift beyond target crops and notify the spray aircraft flight lead when conditions might merit canceling a spray flight. A copy of the directive from the Department of State's Bureau of International Narcotics and Law Enforcement Affairs (INL) Office of Aviation to the eradication contractor that formalizes these new spray regulations is included as Attachment D.

The Department of State's Assistant Secretary for INL also directed the team of United States Department of Agriculture (USDA) and Government of Colombia scientists, responsible for the ground truth verification missions, to incorporate an analysis and quantification of overspray into ground truth verification exercises. While past verification missions sought out and noted cases of overspray, documenting the existence and extent of any damage to crops or foliage not targeted for eradication, this is now a formal component of the ground truthing exercise. The most recent ground truth verification mission (December 9-20, 2002) found that incidences of

overspray were minor. The USDA Agricultural Research Service report from this verification exercise has not yet been completed, and INL will forward a complete copy to EPA as soon as the Department of State receives the report.

#### 4. Changes in Chemical Composition and Spraying Methods Since 2002 Report

Apart from changing to a more benign formulation of glyphosate spray mixture, as discussed earlier, there have been no changes to any of the components of the spray mixture. For some time in 2002, the Government of Colombia lowered the application rate of glyphosate for coca eradication from the traditional application rate of 10.4 liters per hectare to 8.0 liters per hectare. After extensive ground truth evaluation, it was determined that the lower rate was ineffective for killing coca. Thus the application rate was returned to its former rate of 10.4 liters per hectare, which was the rate reported in the Department's Report on Issues Related to the Eradication of Illicit Coca in Colombia in 2002 -- the rate that EPA evaluated when analyzing the potential for risks of adverse effects on human health and the environment posed by the coca eradication program.

The only changes in the methodology used to spray coca since the time of the last report is the addition of a new type of spray aircraft to the spray fleet. Four Air Tractor Model 802 (AT-802) aircraft are currently being used to spray coca, and another four will be delivered this year. These aircraft are manufactured in the United States for agricultural crop spraying and utilize the identical nozzles (same brand and diameter) in the identical configuration (nozzle angle, droplet size, calibration methods) as the OV-10 and T-65 spray aircraft. AT-802 flight speed during eradication operations is 165 m.p.h.

#### 5. Differences Between Opium Poppy Spraying and Coca Spraying

The Secretary of State was not required to determine and report to Congress on any aspects of the opium poppy eradication program in FY2002, and thus the Department did not provide information to EPA on the chemicals and methodology of poppy spraying. Like the coca spray mixture described in the Report on Issues Related to the Eradication of Illicit Coca in Colombia, the opium poppy spray mixture contains three components: water, an EPA-registered formulation of the herbicide glyphosate, and a surfactant (Cosmo-Flux 411F). Because the opium poppy is not a woody, hard-to-control species like the coca bush, opium poppy eradication uses a spray mixture with a substantially lower glyphosate content than the spray mixture used for coca eradication (see Attachment E). For opium poppy spraying, water, formulated glyphosate, and surfactant are combined into a spray mixture in the following percentages: 94 percent water, 5 percent glyphosate formulation, and 1 percent Cosmo-Flux 411F. This diluted mixture is applied to opium poppy at the rate of 50.0 liters/hectare (or 5.46 gallons per acre). This application rate is within the glyphosate manufacturer's label recommendations for both the amount of concentrated formulation per acre and the amount of total spray volume per acre.

Opium poppy spraying differs from coca spraying in several ways. Because Colombia cultivates much less opium poppy than coca and spray program resources are limited, aircraft spray much more coca than opium poppy, therefore expending more spray chemicals in coca growing areas than in areas where opium poppy is cultivated. For example, in 2002, eradication aircraft sprayed totals of 122,700 hectares of coca and 3,000 hectares of opium poppy. Opium poppy is generally cultivated in plots that are smaller than the average coca field. While difficult to quantify precisely, opium poppy fields generally range from 0.5 to 5 hectares. Opium poppy is ordinarily cultivated at a higher altitude than coca, and thus opium poppy often is cultivated and sprayed in hilly to mountainous terrain. For these reasons, the T-65 is the only aircraft used to spray opium poppy because it has a smaller wingspan (and spray swath) than the OV-10 or AT-802 and because it is a more agile aircraft capable of staying close to the ground in more steeply graded, rugged terrain.

Because of the challenges of mountain spraying, pilots undergo an extended training program before they are qualified to perform actual opium poppy spray operations in Colombia. As the Department of State reported in 2002, coca eradication pilots must have approximately 3,000 total flight hours before they are considered for the spray program and can receive preliminary training in illicit crop eradication. Most of these pilots also have at least 1,500 hours of commercial aerial application (crop dusting) experience. In addition to these requirements, opium poppy spray pilots must undergo 40 hours of follow-on training specific to the topography, wind conditions, and cloud cover that they will experience in their area of operations.

#### Attachments

- A. Toxicological testing results for coca spray mixture (Purity Analysis for Glyphosate, Acute Oral Toxicity Study, Acute Dermal Toxicity Study, Acute Nose-Only Inhalation Toxicity Study, Primary Eye Irritation Study, Primary Skin Irritation Study, Dermal Sensitization Study).
- B. Investigative Report on Cases of Possible Human Health Effects in Puerto Asís, Jorge Hernández Botero Tobón, M.D. Bogotón, Colombia, September 19, 2002.

- C. Outline of Spray Pilot Semi-Annual Briefing.
- D. Memo from INL Office of Aviation Director of Operations to DynCorp Operations Manager re: Aerial Eradication Procedures, December 13, 2002.
- E. Coca and Opium Poppy Spray Mixtures Comparison Graph.

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## Coca and Opium Poppy Spray Mixtures Comparison Graph

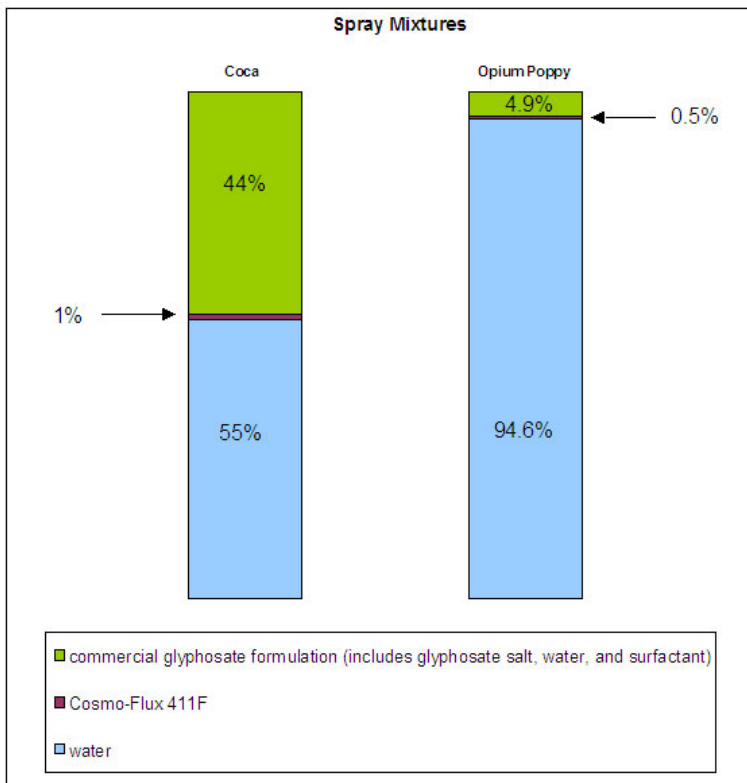
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### Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia

BUREAU OF INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

December 2003

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U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF PESTICIDE PROGRAMS

DETAILS OF THE 2003 CONSULTATION  
FOR THE DEPARTMENT OF STATE

USE OF PESTICIDE FOR COCA AND POPPY  
ERADICATION PROGRAM IN COLOMBIA

JUNE 2003



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## **EXECUTIVE SUMMARY**

### **CONSULTATION REVIEW OF THE USE OF PESTICIDES FOR COCA AND POPPY ERADICATION IN COLOMBIA (2003)**

#### **BACKGROUND**

The Department of State continues to assist the Government of Colombia with training, contractor support, financial assistance, and technical and scientific advice for an aerial pesticide spraying program designed to eradicate illicit crops (coca and poppy). The Department of State has again consulted with the Environmental Protection Agency (EPA) on whether “the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States” and that “the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans health or the environment.”

Similar to this year, in 2002 EPA conducted a review of coca eradication activities in Colombia. The Agency has determined that its findings from 2002 remain relevant to the current coca eradication activities in Colombia. For 2003, EPA was asked to also consider the opium poppy eradication program.

#### **2002 REVIEW OF COCA ERADICATION PROGRAM**

Last year, EPA reviewed the coca eradication program in Colombia and concluded that there was no evidence of significant human health or environmental risks from the spraying. The Agency did recommend that the Department of State switch to an herbicide product with lower toxicity due to a potential for hazard to the eyes of pesticide mixers/loaders. EPA also requested the Department of State to conduct field investigations of health complaints associated with coca eradication. The Agency further concluded that spray drift was likely to cause phytotoxicity downwind of coca fields. The final primary conclusion was that EPA could not verify the product formulation because the product was being manufactured outside of the U.S.

#### **2003 FINDINGS**

The Department of State followed EPA’s 2002 recommendation by beginning use of a lower toxicity glyphosate product in its coca and poppy eradication programs and implementing a program to investigate health complaints. As with coca eradication, the use of glyphosate for opium poppy eradication is done aurally. Based on information provided by the Department of State, several conclusions may be reached concerning poppy eradication: total area sprayed is less than for coca eradication, individual poppy sites are smaller and located at higher elevations, and the rate of glyphosate for poppy eradication is lower than that for coca. Based on a comparison of the glyphosate use pattern in Colombia, as described by the Department of State, and use in the U.S., EPA has determined that application rates for both coca and poppy eradication in Colombia are within the parameters listed on U.S. labels.

As for human health concerns, EPA concludes there are no risks of concern from dietary, mixer/loader/applicator or field workers, or bystanders (including children). The concerns for mixer/loader eye irritation discussed in the Agency's 2002 findings have been mitigated by switching to the lower toxicity product. The Department of State and the Government of Colombia initiated two programs to investigate health complaints. Of those cases investigated to date in Colombia, no findings directly link adverse health effects to the spraying.

In regard to potential environmental effects from the coca and poppy eradication programs, EPA concludes that the switch to a lower toxicity product will pose less risk of acute poisoning to wildlife. The Agency believes that the potential for spray drift phytotoxicity is still a factor for both coca and poppy spraying. EPA recognizes that the Department of State is employing Best Management Practices to minimize drift and encourages them to continue these efforts.

EPA cannot verify the quality of the product manufactured, since the actual formulation is done in Colombia. The Agency did, however, review toxicity testing conducted on the spray mixture solution being applied in Colombia and did not find any irregularities.

For 2003, EPA recommends that the Department of State continue programs for investigating health complaints. The Agency also requests that Department of State improve its definition of glyphosate poisoning, provide further documentation of its investigations and how they are conducted, and standardize data collection.

Details of EPA's findings are provided in the attached document.

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## **I. PESTICIDE USE ASSESSMENT**

### **A. Introduction**

The Biological and Economic Analysis Division (BEAD) in the Office of Pesticide Programs within the Environmental Protection Agency (EPA) has augmented the 2002 EPA assessment and description of the use of glyphosate in the United States (1) as a basis for comparison to glyphosate use in Colombia for coca eradication with a discussion of changes in the program for 2003. This request has come from the Department of State (DoS) which is required to consult with the EPA before reporting to Congress on the use of glyphosate for the Andean counter drug initiative. This year DoS is required to include glyphosate for control of opium poppy in its consultation. This document compares the described use on opium poppy and coca to use within the US.

### **B. Summary**

The use of glyphosate for control of opium poppy is conducted at 1 lb ai/acre (0.8 lb a.e/acre) and at a spray mixture (product + water diluent + Cosmoflux 411F surfactant) volume of about 5.5 gallons per acre (50 liters/hectare). This application rate is within the label recommendations for the amount of concentrated formulation per acre and the amount of total spray volume per acre for application for glyphosate products registered for use in the US.

### **C. Background**

Glyphosate is the most widely used herbicide in the US (1). It is non-selective in action and is used where total vegetation control is desired. It is used on a variety of sites including agricultural crops, lawns, gardens, forests and utility grounds. Application is made to the target plant's foliage, and after being absorbed, glyphosate circulates within the plant, exerting herbicidal activity systemically. Glyphosate and its use within the US were described in the 2002 EPA assessment. In its assessment report, EPA described the use of glyphosate in the US in the following paragraph:

“Glyphosate may be used on over 400 crop and non-crop sites. The largest agricultural use sites include soybeans, cotton and field corn. In addition to agricultural use, EPA estimates that 16-22 million pounds of the technical grade active ingredient were applied to non-agricultural sites in 1999 (this is the most recent year for which adequate data are available). This estimate includes both home owner and professional applications as well as use on forested lands. Based on EPA data for 1999, an estimated 1-2 million pounds of glyphosate was applied to forest acres, with more than 650,000 forest acres treated.”

In 2002, a description of glyphosate use in forestry sites in the US was included since use for coca eradication would be most similar to the US labeled use for broad-spectrum post-emergence weed control for forestry site preparation and utility rights-of-way. For coca eradication, glyphosate is sprayed from fixed wing aircraft at speeds around 165 mph at 4.4 pounds active ingredient (isopropylamine salt) per acre in about two gallons of spray mixture per acre.

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Aerial application of the glyphosate product to non-crop, non-timber, industrial and rights-of-way areas in the US is allowed using fixed wing aircraft and helicopter to control annual and perennial weeds and woody brush and trees. Although application may be made at up to 10 lb ai/year per acre in the US, the typical use rate per application is much lower, averaging less than one pound per acre on major agricultural sites (EPA has no data on average application rate to forest sites). In addition, product labeling recommends application at 3 to 15 gallons of total spray mixture volume per acre for aerial application to forestry sites.

#### **D. Opium Poppy Eradication**

Glyphosate used for the opium poppy eradication program is also applied aerially, however its use differs in several ways from the coca eradication program:

1. Total area sprayed is much smaller for poppy eradication. The State Department explains that:

“Because Colombia cultivates much less opium poppy than coca and spray resources are limited, aircraft spray much more coca than poppy, therefore expending more spray chemicals in coca growing areas than in areas where opium poppy is cultivated. For example, in 2002, eradication aircraft sprayed totals of 122,700 hectares of coca [about 303,000 acres] and 3,000 hectares [about 7400 acres] of opium poppy.”

2. Individual poppy spray sites are smaller and located at higher elevations. The State Department states:

“While difficult to quantify precisely, opium poppy fields generally range from 0.5 to 5 hectares. Opium poppy is ordinarily cultivated at a higher altitude than coca, and thus opium poppy often is cultivated and sprayed in hilly to mountainous terrain.”

3. The rate (or dose) of glyphosate for poppy eradication is lower than that for coca eradication. The State Department states:

“Because the opium poppy is not a woody, hard-to-control species like the coca bush, opium poppy eradication uses a spray mixture with a substantially lower glyphosate content than the spray mixture used for coca eradication.”

The Department of State described the concentrate formulation for use in 2003 as containing 41 percent glyphosate salt and 59 percent inert ingredients. The same concentrate formulation is being used for both coca and opium poppy eradication (1). Other similar products with this proportion of active to inert ingredients are registered with the US Environmental Protection Agency for use in the US on forestry and utility rights-of-way sites. A surfactant is added to the diluted spray mixture prior to spraying. This practice improves absorption of the herbicide by the plant and is standard practice for applying glyphosate to forestry sites in the US.

For opium poppy spraying, water, formulated glyphosate, and surfactant are combined in a spray mixture in the following percentages: 94 percent water, 5 percent glyphosate formulation, and 1 percent surfactant. This diluted spray mixture is applied to opium poppy at the rate of 50.0

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liters/hectare (or 5.5 gallons per acre) (1). This is equivalent to 1 lb ai/A isopropylamine salt (or 0.8 a.e./acre) as illustrated in the calculation below.

Calculation of rate of application for opium poppy:

(50 liters spray mixture/1 hectare) (5% glyphosate product/1 liter spray mixture) (4 lbs. ai isopropylamine glyphosate salt/1 gallon formulated product<sup>1</sup>)(1 gallon/3.78 liter) (1 hectare/2.47 acres) = 1.1 lb ai/acre

In contrast, the Department of State reports glyphosate use for coca eradication at 10.4 l/ha of glyphosate product which is equivalent to 4.4 lb a.i./acre of glyphosate isopropylamine salt (3.3 a.e./acre) as illustrated in the calculation below.

Calculation of rate of application for coca eradication:

(10.4 liter spray mixture/1 hectare) (4 lbs ai isopropylamine glyphosate salt/1 gallon glyphosate product<sup>1</sup>) (1gallon/3.78 liter) (1 hectare/2.47 acres) = 4.4 lb ai/acre

Although glyphosate is applied aurally to wooded sites, the rate of application is more similar to that for agricultural uses than for forestry uses. Agricultural use of glyphosate is common at rates lower than 0.5 lb ai/A. In contrast, product labels for the use of glyphosate for forestry sites start at rates of 2 lbs ai/A.

## **E. Conclusions**

This application rate for opium poppy eradication is within the glyphosate manufacturer's label recommendations for both the amount of concentrated formulation per acre and the amount of total spray volume per acre. The Department of State informed EPA that the coca use is the same as described in the 2002 assessment, except for a change in product.

## REFERENCES

- (1) U.S. Environmental Protection Agency, Office of Pesticide Programs, Details of the Consultation for Department of State, Use of Pesticide for Coca Eradication Program in Colombia, August 2002.
- (2) Department of State Updated Report on Chemicals Used in the Columbian Aerial Eradication Program. Attachment to a letter from Secretary of State, Colin Powell, to Environmental Protection Agency Administrator, Governor Christine Whitman, April 9, 2003.
- (3) Donaldson, D., T. Kiely, and A. Grube. Pesticide Industry Sales and Usage, 1998 and 1999 Market Estimates. June 2002. Biological and Economic Analysis Division, Office of Pesticide Programs, U.S. Environmental Protection Agency.
- (4) Agricultural Chemical Usage - 2000 Field Crops Summary. May 2001. US Department of Agriculture. National Agricultural Statistics Service.



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## II. HUMAN HEALTH RISK ASSESSMENT

### A. Introduction

In April 2003, the DoS requested that EPA provide a human health risk assessment for the aerial eradication of coca and poppy in Colombia. To facilitate this request, in addition to the information provided for the previous assessment, the DoS provided a report entitled, Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program and submitted acute toxicity tests for the spray mixture used in the coca eradication program assessed previously.

Unless otherwise specified, all information pertaining to the coca and poppy eradication programs in Colombia was provided to the Agency from three sources: (1) DoS Presentation, DoS Coca Eradication Program, 4/18/02, (2) DoS document entitled Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application, (3) DoS report entitled Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program.

#### *USE PATTERN*

The glyphosate tank mixture is applied as an over the top aerial foliar application to coca in certain provinces within Columbia. The tank mixture sprayed for eradication of coca in Columbia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). Up to two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons of product/acre.

According to updated information provided by the DoS, "Apart from changing to a more benign formulation of glyphosate spray mixture, there have been no changes to any of the components of the spray mixture." The only changes in the methodology used in the spray program is the use of a new aircraft, the Four Air Tractor Model 802 (AT-802). These aircraft utilize the identical nozzles (same brand and diameter) in the identical configuration (nozzle angle, droplet size, calibration methods) as the aircraft evaluated in the previous assessment.

The opium poppy spray mixture contains the same components as the spray mixture used in the coca eradication program. According to information provided by DoS, the spray mixture used in the opium poppy eradication program contains a substantially lower concentration of glyphosate than the spray mixture used for coca eradication (1.11 gallons glyphosate/A for coca versus 0.27 gallons glyphosate /A for poppy). This application rate is within the manufacturer's product label recommendations.

The poppy eradication program differs from the coca eradication program in several ways. According to the DoS report, poppy fields are generally smaller than coca fields, ranging from 0.5 to 5 hectares. Also, poppy is often cultivated and sprayed in more mountainous terrain than coca.



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As for the previous assessment, in order to assess the hazard of what was sprayed in Columbia, the components of the mixture were evaluated separately.

#### *HAZARD ASSESSMENT*

The **Cosmo-Flux 411F** adjuvant used in the glyphosate tank mix is produced by a Colombian company and is not sold domestically. All ingredients of this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. Cosmo-Flux 411F consists mainly of (*information not included as it may be entitled to confidential treatment*) with a nonionic surfactant blend primarily composed of (*information not included as it may be entitled to confidential treatment*).

The available hazard data base on experimental animals indicates that the glyphosate technical grade active ingredient (TGAI) has low acute toxicity via the oral and dermal routes. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2-generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which resulted in evidence of appreciable parental toxicity. The Food Quality Protection Act (FQPA) Safety Factor Committee (SFC) concluded that the safety factor, to protect infants and children, of 10x be removed (reduced to 1x). The Hazard Identification Assessment Review Committee (HIARC) met on March 26, 1998 and, again, on November 20, 2001. The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary exposure and residential/occupational exposure. No endpoints were selected for the acute Reference Dose (RfD) since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no concerns for developmental or reproductive toxicity. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term 1 to 30 days, intermediate term 1 to 6 months, or long term 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate. HIARC did identify an incidental oral endpoint for short- and intermediate-term exposure. The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. Glyphosate was not mutagenic in a full battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a "Group E" chemical (no evidence of carcinogenicity to humans).

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*EXPOSURE*

An exposure and risk assessment are required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential for exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for acute dietary, dermal, or inhalation exposures. Therefore, quantitative estimates of risk for these exposure durations have not been conducted.

Acute **dietary exposure** is possible for persons consuming livestock or food crops which have been inadvertently sprayed as a result of the aerial eradication program in Columbia. However, since glyphosate is a contact herbicide that systemically kills plants after absorption through leaves, dietary exposure due to consumption of treated crops is expected to be limited. In addition, since an acute dietary endpoint of concern was not identified in the hazard database, no significant risk due to acute dietary food exposure to glyphosate residues is expected. Based on the fact that a poppy field is sprayed no more than twice to eradicate the crop, no chronic food exposure is expected.

Handler (e.g., individuals mixing the concentrated formulated product to prepare the tank mix and loading the tank mix in the aircraft) exposure is anticipated for short-term (1-30 days) and, possibly intermediate-term (1-6 months) durations based on the frequency of application and duration of the spray program.

Based on the use pattern described by the DoS, short-term dermal post-application exposures are expected for persons re-entering treated coca and poppy fields immediately after spray events. In cases such as glyphosate, where the vapor pressure is negligible, OPP experience with post-application data suggests that inhalation exposure is minimal and does not quantitatively assess post-application inhalation exposure. Intermediate and long-term post-application exposures are not expected due in part to the fact that coca and poppy fields are sprayed no more than twice to eradicate the crop. Additionally, glyphosate is a translocated herbicide which is rain fast within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal.

DoS states that pilots are instructed not to spray fields where people are present. Therefore, incidental oral exposure (hand-to-mouth) resulting from individuals being directly sprayed by glyphosate was not quantitatively assessed. Also, it is not current Agency policy to quantitatively assess toddler hand-to-mouth exposure resulting from spray drift. Additionally, HED does not currently perform exposure assessments for toddler non-dietary oral exposures for agricultural scenarios. As a point of comparison, screening level risk estimates for toddler incidental oral exposures (hand-to-mouth) to the U.S. registered residential turf uses of glyphosate have been calculated. Using the same standard screening level assumptions as used in the residential assessment for the U.S. registered turf use and taking the higher application rate into account, the potential risks from incidental oral exposure due to the spraying of glyphosate as part of the coca and poppy eradication program would not exceed HED's level of concern.

There is potential for exposure to persons in nearby areas to those targeted for spraying. However, the technology and other safeguards used in this program are consistent with common approaches in the US for reducing **spray drift**. Therefore, it is likely that drift is minimized in this program if all procedures are adhered to and operational equipment is in working order.

From the review of Colombian glyphosate product human **incident reports** for poppy eradication (evaluated in the previous assessment), it should be emphasized that the overwhelming majority (95%) of the illnesses reported are likely background incidents unrelated to the spraying of herbicide on poppy. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incidence data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There are data to suggest that the poppy spray eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

The *glyphosate formulated product* used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* is classified as toxicity category III for primary eye irritation and toxicity category IV for acute dermal and oral toxicity, and skin irritation. It is not a dermal sensitizer. The product currently used in the coca and poppy aerial eradication program is classified as toxicity category III for primary eye irritation and toxicity category IV for acute dermal and oral toxicity, and skin irritation and is not a dermal sensitizer. The label for the *formulated product* used in the poppy eradication program in Colombia uses “Caution” as the signal word.

The overall conclusion from the earlier review stated that “There is some data to suggest that the spray eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on timing of application, history of exposure, and medical documentation of symptoms related to glyphosate exposure were not available. Thus, the reported symptoms cannot be confirmed to be a result of the spray applications. The information collected gives the impression that any increase in health problems is likely to be relatively small, and the severity of those symptoms is likely to be minor to moderate. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that glyphosate spraying has been a significant cause of illness in the region studied. Some of the reports in Colombia, potentially related to glyphosate tank mix exposure, are similar in nature to those reported in the literature and by

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California. These cases report irritation to skin, eyes, and respiratory passages. This suggests that the Cosmo-Flux 411F added to the glyphosate in Colombia has little or no effect on the overall toxicity of the formulated product. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent occurrence.”

In the 2002 assessment the DoS requested advice on whether the aerial application program may pose unreasonable risks or adverse effects to humans or the environment. The current (2003) assessment considers recent exposure information provided to the Agency for the DoS Colombia poppy eradication program in light of the 2002 assessment. Current information indicates that the Government of Colombia and the U.S. Embassy Bogota have adhered to the EPA advice . . . “Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent occurrence.” The 2003 submission from the “Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program” to the EPA indicates that “A visit to the hospital and interviews with doctors there revealed no cases of poisoning or illness attributable to spray chemicals.” U.S. Embassy-contracted toxicologists talked to patients and talked to local medical personnel, looking for spray-related cases. . . The report concluded that “Through Medical Civic Action Program (Medcap) and other medical investigations, the U.S. Embassy has never found an instance of spray-related harm to human health.”. Missing from their account was a clearly stated case definition for what would constitute a glyphosate-related poisoning. A case definition is required if the conclusion that they have “never found an instance of spray-related harm to human health” is to be supported.

During April 18 briefing, the Department of State agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix used in the coca aerial eradication program. That information has been received and reviewed. In summary, the acute toxicity of the spray mixture is category III for eye irritation and category IV for skin irritation and acute dermal, oral and inhalation exposure and is negative for dermal sensitization.

## **B. Background**

EPA regulates pesticides under two statutes, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). FIFRA provides the authority to register and review pesticides as well as the authority to suspend and cancel if use poses unreasonable risks. FFDCA provides authority to set maximum residue levels (tolerances) for pesticides used in or on foods or animal feeds.

Section 3 of FIFRA provides authority to register (license for sale and distribution) pesticide products. The label of the pesticide product specifies the use (pest and crop/site), amount of product to be applied, frequency, timing of use, restrictions, storage and disposal practices and precautionary statements. The active ingredient in a pesticide product is the “ingredient which will prevent, destroy, repel, or mitigate any pest.” The inert or other ingredient(s) in a pesticide product is “an ingredient which is not active.” The registrant must provide data for the Agency

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to assess potential environmental and human health risks. The data required to make a safety finding are dependent on the intended use, e.g., food use vs non-food use. The data requirements for pesticides may be found in 40 CFR Part 158. For human health risk assessment, data is required to permit characterization of hazard and exposure.

Data requirements on the chemical identity and composition of the formulated pesticide product, may be found in 40 CFR 158.150. The list of ingredients for a pesticide product and the percent of each ingredient in the formulation are contained in the confidential statement of formula (CSF). The CSF is FIFRA confidential business information (CBI) and is entitled to treatment as trade secret or proprietary information. Agency risk assessments do not typically contain this information.

Residue chemistry data required as per 40 CFR 158.240 support the ability of the Agency to estimate the amount of pesticide that will result in food as a result of application of the pesticide according to the product labels directions for use. The magnitude of the residue studies for crop field trials use the typical end use product as the test material. The livestock feeding studies are required whenever a pesticide residue will be present in livestock feed. The livestock feeding studies evaluate the magnitude of the resulting pesticide residue in meat, milk, poultry, and eggs. The studies are conducted with the technical grade of the active ingredient or the plant metabolites. Residue chemistry data are also required to identify any potential metabolites of concern. These data are used to determine the tolerances for the parent and/or metabolites. Additional data is required on environmental fate, degradation, metabolism, and dissipation.

Hazard data required for human health risk assessment are provided in 40 CFR 158.340. The use of the active ingredient (i.e., food use or non-food use) will determine what studies are required. The acute toxicity data on the technical grade of the active ingredient are used for classification and precautionary labeling for protective clothing requirements, and worker reentry intervals. The only studies that are required to be conducted on the manufacturing use product or end use product are the acute toxicity studies. The remaining toxicology studies (e.g., developmental toxicity, reproduction, subchronic, chronic feeding, or carcinogenicity studies) require that the test substance is the technical grade of the active ingredient. Subchronic toxicity studies provide data on potential target organ toxicity and are also used to select dose levels for long term or chronic toxicity studies. Chronic toxicity or carcinogenicity studies are conducted for food use chemicals to determine potential effects following prolonged or repeated exposure that may have a latency period for expression. The test animals are exposed orally for a significant portion of their life span. Developmental toxicity studies are required in two species (usually the rat and rabbit) for food use chemicals. They are conducted to detect alterations in the normal development of fetuses following *in utero* exposure. The 2-generation rat reproductive toxicity study is required to assess potential alterations in gonadal function, estrus cycles, mating, conception, birth, lactation, weaning, as well as growth and development of offspring. The Agency also requires a battery of mutagenicity studies to assess the potential induction of changes in the genetic material of cells. The above studies are required for food use active ingredients. In general, less data is required for non-food use active ingredients and inerts unless a concern has triggered additional testing.

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The Agency conducts separate risk assessments for all pesticide active ingredients and has conducted risk assessments for some inerts. The remaining inerts are cleared by the Agency. It should be understood that whenever the inert ingredient was cleared, whenever the tolerance exemption was established, the inert met the standards of the time.

Inert ingredients, also known as “other ingredients,” are the carrier for the active ingredients which allow the product to deliver the active ingredient at a specific rate and ensure proper distribution during application. Currently there are over 3200 inert ingredients cleared by EPA for use in various domestic pesticides products. There are two major classifications: non-food use (such as lawn care products and bathroom cleaners), and food-use, which require an exemption from the requirement of a tolerance and can also be used in non-food products.

The Agency has a newly developed methodology for evaluating low or low/moderate toxicity chemical substances by way of a screening process that incorporates elements of a tiered approach. Use of this process will permit the Agency to clear more chemicals of low to moderate toxicity for use in pesticide products. The Agency is aware that some chemicals may be used as inert ingredients in some formulations and as active ingredients in other formulations. EPA believes this methodology is appropriate for evaluating some low toxicity chemicals regardless of whether they are categorized as active or inert ingredients. The new process will permit the Agency to be able to conduct more in-depth evaluations of other ingredients that are of potentially higher toxicity. Chemicals of higher toxicity that cannot be appropriately addressed in the lower tiers would be evaluated in a manner substantially similar to that of an active ingredient. Later as the Agency begins to review chemical-specific or surrogate information in the open literature, the preliminary tier determination may be revised.

Inert ingredients that are exempt from tolerance are listed in 40 CFR 180.1001 (c). The inert ingredients in the glyphosate formulation have been approved by the Agency. The components of the adjuvant (Cosmo-Flux 411F) that have been sprayed on coca plants in Colombia, have also been determined to be approved for use on food by the Agency.

The two federal statutes for regulating pesticides in the US give EPA limited authority to regulate the sale, or use of adjuvants in the US. EPA has authority to regulate an adjuvant if it is purposely included in the manufacturing process of a pesticide product in which case the chemical would be regarded as an inert ingredient. In the US as with all countries, adjuvants are commonly used and added to pesticides as wetting agents, spreaders, emulsifiers, antifoamers, and penetrants. These may contain surfactants, solvents, or other types of chemicals to achieve the desired purpose.

An adjuvant is a subsidiary ingredient or additive product added to a pesticide in a mixture that aids the effectiveness of the primary or active ingredient. Adjuvants are most commonly added to tank mixes of pesticide products prior to application to the site to be treated. Adjuvants are not subject to FIFRA registration, as no pesticidal claims are made. Pesticide manufacturers choose whether or not to address on their product labels the use of adjuvants with their product(s). However, when added to a tank mix for application to a food or feed crop/site, the

individual components must be cleared under FFDCA. While adjuvant products are not registered on the federal level, they are subject to registration under some state laws. The states of Washington and California are two states that register adjuvants. The adjuvant (Cosmo-Flux 411F) used in the glyphosate tank mix is produced by a Colombian company and is not sold domestically. The Department of State has agreed to provide the Agency with acute toxicity data performed on the actual tank mix that has been sprayed in Colombia.

### **C. Historical Regulatory Information**

The glyphosate product currently used in the Colombian aerial eradication program was registered in August 1994. It was intended to replace the glyphosate products on the market that were in toxicity category I and II for eye irritation with a product that was category III for eye irritation. The currently used product also offered improves rain fastness and is currently one of the major glyphosate products used in agriculture in the US. In August 2002, the registrant submitted a label for ground and aerial application to kill undesirable vegetation in a variety of non-agricultural sites.

### **D. Hazard Identification**

Hazard identification is the first step in the risk assessment process. The objective is to qualitatively characterize the inherent toxicity of a chemical. Scientific data are evaluated to establish a causal relationship between the occurrence of adverse health effects and exposure to a chemical. Because high quality controlled toxicology studies on humans are frequently unavailable, regulatory scientists rely on animal data to estimate hazard to support regulatory decision making. Prior to and subsequent to initial registration, the Agency has required the registrants of glyphosate products to submit appropriate studies according to contemporary study requirements and testing protocol requirements.

### **Glyphosate Technical**

The available hazard data base on experimental animals indicates that glyphosate has low acute toxicity via the oral and dermal routes with  $LD_{50s} > 5000$  mg/kg. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2-generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which resulted in evidence of appreciable parental toxicity. Glyphosate was not mutagenic in a full

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battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a “Group E” chemical (no evidence of carcinogenicity to humans).

### Components of the Glyphosate Product

**1. Polyoxyethylene alkylamine (POEA).** POEA is a compound that is used as a surfactant with many glyphosate formulations. In a safety evaluation and risk assessment of glyphosate, the Roundup formulation and the surfactant POEA, Williams *et al.* (2000) reported that POEA can cause severe skin irritation and be corrosive to the eyes. In subchronic oral studies, POEA was mainly a gastrointestinal irritant in rats at high doses (~ 100 mg/kg/day) and in dogs at lower doses (30 mg/kg/day). In a developmental toxicity study in rats, POEA did not cause any developmental effects up to 300 mg/kg/day, but did induce maternal toxicity at 100 and 300 mg/kg/day (Farmer *et al.*, 2000). The concentrated formulated Roundup product can also be strongly irritating to the eyes and slightly irritating to the skin (Williams *et al.*, 2000).

**2. (information not included as it may be entitled to confidential treatment).** (information not included as it may be entitled to confidential treatment) are substances that are not highly toxic by oral or dermal routes and are not irritating to the skin. They may cause mild, transient eye irritation. Many (information not included as it may be entitled to confidential treatment) are known not to be sensitizers (information not included as it may be entitled to confidential treatment). The molecular weight of a (information not included as it may be entitled to confidential treatment) determines its biological properties, and, thus, its toxicity. The lower molecular weight (information not included as it may be entitled to confidential treatment) tend to be more toxic than the higher-weighted (information not included as it may be entitled to confidential treatment) and are absorbed by the digestive tract and excreted in the urine and feces, while the higher molecular weight (information not included as it may be entitled to confidential treatment) are absorbed more slowly or not at all (information not included as it may be entitled to confidential treatment). (information not included as it may be entitled to confidential treatment) have low acute and chronic toxicity in animal studies. No significant adverse effects have been noted in inhalation toxicology studies, carcinogen testing, or mutagen assays. High oral doses have resulted in toxic effects to the kidneys and loose feces (information not included as it may be entitled to confidential treatment). Topical dermal application of (information not included as it may be entitled to confidential treatment) to burn patients with injured skin has resulted in toxicity. (information not included as it may be entitled to confidential treatment).

### Cosmo - Flux 411F (Adjuvant)

The Cosmo-Flux 411F adjuvant product used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Agency is not in possession of toxicity data from direct dosing of test animals with Cosmo-Flux 411F. However, the Agency has made safety findings based on the toxicity of the individual components. As stated above, sale or use of spray adjuvant products in the U.S. are generally not regulated by EPA. However, the DoS



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has provided the EPA with a copy of this product's label and a description of the product ingredients. To be able to provide an opinion on hazard characterization of the CosmoFlux ingredients, the EPA relied on available technical information from various sources. Cosmo-Flux 411F consists mainly of (*information not included as it may be entitled to confidential treatment*) with a nonionic surfactant blend primarily composed of (*information not included as it may be entitled to confidential treatment*). All ingredients of this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. All components of the adjuvant have been approved for use in/on food by EPA (40 CFR 180.1001).

### **Components of CosmoFlux (Considered as CBI)**

**1. (*information not included as it may be entitled to confidential treatment*).** The (*information not included as it may be entitled to confidential treatment*) can cause dermal and ocular irritation and, in high doses orally, can cause significant toxicity. However, small amounts are not a concern and these substances have been approved as food additives by the FDA and are exempt from tolerances by EPA on certain commodities.

**2. (*information not included as it may be entitled to confidential treatment*).** The other major component of Cosmo-Flux 411F, (*information not included as it may be entitled to confidential treatment*), is not considered highly toxic. It may cause mild eye and skin irritation. The corresponding monoester, (*information not included as it may be entitled to confidential treatment*), has low subacute, subchronic and chronic oral toxicity and is used as a direct food additive and a component in cosmetics. The higher molecular weight triester is less likely to be absorbed orally or dermally and most likely of less toxicological concern. The other minor components, are not known to be highly toxic compounds and would not be of toxicological concern at the concentrations and conditions in which they are used.

### **E. Dose Response Assessment**

Dose response analysis is the second step in the risk assessment process i.e.; characterization of the quantitative relationship between exposure (dose) and response based on studies in which adverse health effects have been observed. The objective is to identify endpoints of concern which correspond to the route and duration of exposure based on the exposure patterns.

HED selects doses and endpoints (effects of concern) for risk assessment via an internal peer review process. HED uses a standing Committee - the Hazard Identification Assessment Review Committee (HIARC), to consider the available hazard data (studies required to be submitted by registrants in 40 CFR part 158 and open peer reviewed literature) to identify endpoints for use in risk assessment.

Ideally, each safety study identifies a dose level that does not produce a biological or statistically significant increased incidence of an adverse effect or no observable adverse effect level (NOAEL). The threshold dose is the smallest dose required to produce a detectable effect. Below this dose, there is no detectable response.

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On **March 26, 1998 and, again, on November 20, 2001** the HED HIARC met to examine the hazard data base and identify dietary endpoints for Females 13-50 years old, as well as the General Population, the chronic reference dose. The HIARC also considered toxicological endpoints for incidental oral exposure appropriate in residential exposure risk assessments.

The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary and residential/occupational exposures. OPP calculates acute (24 hour or single day) and chronic (continuous lifetime exposure) RfDs for the purposes of calculating dietary risk for food and drinking water. The RfD is calculated by dividing the appropriate no observed adverse effect level by a ten fold factor for interspecies variability (“average” human sensitivities might be up to 10 times that of lab animals) and a ten fold factor for intraspecies variability (i.e., some individuals within a population might be 10 times more sensitive than the “average” person).

For glyphosate, no endpoints were selected for the acute RfD since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no specific concerns for toxic effects on the developing fetus or infants and children. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term- 1 to 30 days, intermediate term- 1 to 6 months, or long term- 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate. The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. A summary of the doses and toxicological endpoints selected for various relevant exposure scenarios are summarized in Table 1.

**Table 1. Glyphosate Endpoint Selection Table**

| EXPOSURE SCENARIO   | DOSE (mg/kg/day)  | ENDPOINT   | STUDY                          |
|---|---|--|--------------------------------|
| Acute Dietary (24 hour or single exposure)                              | An effect of concern attributable to a single dose was not identified from the oral toxicity studies; there are no concerns for developmental or reproductive toxicity.   |  |                                |
| Chronic Dietary (continuous lifetime exposure)                          | NOAEL = 175<br>uncertainty factor (UF) = 100  | Maternal toxicity based on clinical signs (diarrhea and nasal discharge)resulting in mortality of some dams at 350 mg/kg/day | Developmental toxicity -Rabbit |
|   |   | <b>Chronic RfD = 2.0 mg/kg/day</b>   |                                |
| Incidental Oral, Short- (1-30 days), and Intermediate-(1-6 months) Term | NOAEL= 175  | Maternal toxicity based on clinical signs (diarrhea and nasal discharge)resulting in mortality of some dams at 350 mg/kg/day | Developmental toxicity -Rabbit |
| Dermal, Short-, Intermediate-and Long-Term                              | No hazard was identified, therefore quantification of dermal risk is not required. No systemic toxicity was seen at the Limit Dose (1000 mg/kg/day) following repeated dermal applications to New Zealand White rabbits.  |  |                                |
| Inhalation, Short-, Intermediate-, and Long-Term                        | Quantification of inhalation risk is not required because 1) no hazard was identified in the 28 day inhalation toxicity study in rats - NOAEL = <b>0.36 mg/L</b> (highest dose tested (HDT)); lowest observable adverse effect level (LOAEL) not established based on 6 hours/day, 5 days/week for 4 weeks and 2) due to the physical characteristics of the technical (wetcake), exposure to high levels of the active ingredient is unlikely via the inhalation route, so there was no purpose to test at higher doses. |  |                                |

### Glyphosate Food Quality Protection Act (FQPA) Considerations

On August 3, 1996 the FQPA amended FIFRA and FFDCA. Section 408(B)(II)(C) of FFDCA addresses exposure of infants and children. Under this provision EPA must apply the default 10X safety factor when establishing, modifying, leaving in effect or revoking a tolerance or exemption for a pesticide chemical residue, unless the EPA concludes, based on reliable data, that a different safety factor would protect the safety of infants and children. Risk assessors, therefore presume that the default 10X safety factor applies and should only recommend a different factor, based on an individualized assessment, when reliable data shows that such different factor is safe for infants and children that it does not rely on a default value or presumption in making decisions under Section 408 where reliable data are available that support an individualized determination.

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The OPP FQPA Safety Factor Committee (SFC) makes specific case-by-case determinations as to the need and size of the additional factor if reliable data permit. Determination of the magnitude of the overall safety factor or margin of safety involves evaluating the completeness of the toxicology and exposure databases and the potential for pre- or post-natal toxicity. Individualized assessments may result in the use of additional factors greater or less than, or equal to 10X, or no additional factor at all. (*OPP Guidance Document on Determination of the Appropriate FQPA Safety Factor(s) in Tolerance Assessment, 2002*)

The HIARC addressed the potential enhanced sensitivity of infants and children from exposure to glyphosate as required by the FQPA of 1996 at the March 26, 1998 meeting and reaffirmed the decision at the November 20, 2001 meeting. The HIARC concluded the following:

- Based on the available data, there was no evidence of quantitative and qualitative increased susceptibility to *in utero* and/or postnatal exposure to glyphosate in rats or rabbits.
- Based on a weight of evidence consideration, the HIARC decided **not** to require the conduct of a developmental neurotoxicity study with glyphosate to evaluate the potential for developmental neurotoxic effects because there was no evidence of neurotoxicity and neuropathology in adult animals.

The **FQPA SFC met on April 6, 1998** to evaluate the hazard and exposure data for glyphosate. The FQPA SFC concluded that the safety factor of 10x be removed (reduced to 1x) since there is no evidence of quantitative or qualitative increased susceptibility of the young demonstrated in the prenatal developmental studies in rats and rabbits and pre/post natal reproduction study in rats. In addition the toxicology data base is complete, a developmental neurotoxicity study is **not** required, and the dietary (food and drinking water) exposure assessments will not underestimate the potential exposures for infants and children.

## **F. Exposure Assessment**

The exposure assessment is the third step in the risk assessment process. The objective is to determine the source, type, frequency, magnitude, and duration of actual or hypothetical contact by humans with the agent of interest. To conduct this assessment EPA relied upon the information provided by DoS from three sources: (1) Department of State (DoS) Presentation, DoS Coca Eradication Program, 4/18/02, (2) DoS document entitled Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application. (3) DoS document entitled Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program. These data were used in accordance with standard policies and procedures used by the Agency in conducting pesticide exposure assessments.

### **Dietary Food Exposure**

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Acute dietary exposure is possible for persons consuming livestock or food crops which have been inadvertently sprayed as a result of the aerial eradication program in Colombia. However, since glyphosate is a contact herbicide that systemically kills plants after absorption through leaves, dietary exposure due to consumption of treated crops is expected to be limited. Since a coca field is sprayed no more than twice to eradicate the crop, no chronic food exposure is expected. Based on an evaluation of the hazard database, the Agency did not identify a toxic effect attributed to a single oral dose. Therefore, an acute dietary risk assessment was not performed. No significant risk due to dietary exposure to glyphosate residues is expected.

## **Occupational Handler and Post-application Exposure**

### **Use Pattern Information**

Use on coca based on information supplied by DoS for the previous assessment on coca: The tank mixture sprayed for eradication of coca in Colombia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). No more than two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons/acre (equivalent to 1.1 gallons/Acre of glyphosate product, 0.03 gal/Acre of Cosmo-Flux 411F, and 0.12 gal/acre of water). DoS also stated that the average field size for coca in Colombia is 3-5 hectares (approximately 7-12 acres). The program for aerial eradication of coca treats a maximum of 1000 acres/day, during 3-5 missions/day.

**Updated information for the use on coca and poppy** (Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program.):

**“4. Changes in chemical composition and spraying methods since 2002 report:** Apart from changing to a more benign formulation of glyphosate spray mixture, as discussed earlier, there have been no changes to any of the components of the spray mixture. For some time in 2002, the Government of Colombia lowered the application rate of glyphosate for coca eradication from the traditional rate of 10.4 liters per hectare to 8.0 liters per hectare. After extensive ground truth evaluation, it was determined that the lower rate was ineffective for killing coca. Thus the application rate returned to its former rate of 10.4 liters per hectare, which was the rate reported in the Department’s Report on Issues Related to the Eradication of Illicit Coca in Colombia in 2002 -- the rate that EPA evaluated when analyzing the potential for risks of adverse effects on human health and the environment posed by the coca eradication program. The only changes in the methodology used to spray coca since the time of the last report is the addition of a new type of spray aircraft to the spray fleet. Four Air Tractor Model 802 (AT-802) aircraft are currently being used to spray coca, and another four will be delivered this year. These aircraft are manufactured in the US for agricultural crop spraying and utilize the identical nozzles (same brand and diameter) in the identical configuration (nozzle angle, droplet size, calibration methods) as the OV-10 and T-65 spray aircraft. AT-802 flight speed during eradication operations is 165 m.p.h.

### **5. Differences between opium poppy spraying and coca spraying:**

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The Secretary of State was not required to determine and report to Congress on any aspects of the opium poppy eradication program in FY2002, and thus the Department did not provide information to EPA on the chemicals and methodology of poppy spraying. Like the coca spray mixture described in the "Report on Issues Related to the Eradication of Illicit Coca in Colombia," the opium poppy spray mixture contains three components: water, an EPA-registered formulation of the herbicide glyphosate, and a surfactant (Cosmo-Flux 411F). Because the opium poppy is not a woody, hard-to-control species like the coca bush, opium poppy eradication uses a spray mixture with a substantially lower glyphosate content than the spray mixture used for coca eradication. For opium poppy spraying, water, formulated glyphosate, and surfactant are combined into a spray mixture in the following percentages: 94 percent water, 5 percent glyphosate formulation, and 1 percent Cosmo-Flux 411F. This diluted mixture is applied to opium poppy at the rate of 50.0 liters/hectare (or 5.46 gallons per acre). This application rate is within the glyphosate manufacturer's label recommendations for both the amount of concentrated formulation per acre and the amount of total spray volume per acre.

Opium poppy spraying differs from coca spraying in several ways. Because Colombia cultivates much less opium poppy than coca and spray program resources are limited, aircraft spray much more coca than opium poppy, therefore expending more spray chemicals in coca growing areas than in areas where opium poppy is cultivated. For example, in 2002, eradication aircraft sprayed totals of 122,700 hectares of coca and 3,000 hectares of opium poppy. Opium poppy is generally cultivated in plots that are smaller than the average coca field. While difficult to quantify precisely, opium poppy fields generally range from 0.5 to 5 hectares. Opium poppy is ordinarily cultivated at a higher altitude than coca, and thus opium poppy often is cultivated and sprayed in hilly to mountainous terrain. For these reasons, the T-65 is the only aircraft used to spray opium poppy because it has a smaller wingspan (and spray swath) than the OV-10 or AT-802 and because it is a more agile aircraft capable of staying close to the ground in more steeply graded, rugged terrain.

Because of the challenges of mountain spraying, pilots undergo an extended training program before they are qualified to perform actual opium poppy spray operations in Colombia. As the Department of State reported in 2002, coca eradication pilots must have approximately 3,000 total flight hours before they are considered for the spray program and can receive preliminary training in illicit crop eradication. Most of these pilots also have at least 1,500 hours of commercial aerial application (crop dusting) experience. In addition to these requirements, opium poppy spray pilots must undergo 40 hours of follow-on training specific to the topography, wind conditions, and cloud cover that they will experience in their area of operations".

### **Handler Exposure**

Exposure is expected for workers mixing and loading the glyphosate formulated product and tank mix, and applicators applying the pesticidal mixture via fixed-wing aircraft. Mixers, loaders, and applicators (handlers) have the potential for dermal exposure to the concentrate glyphosate formulated product or tank mix from droplets contacting the skin. There is also the potential for inhalation exposure to the concentrated glyphosate formulated product or mixed formulation from

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breathing in aerosolized spray droplets.

According to the DoS, the mixer/loaders are trained on the label requirements for handling the chemicals in the spray mixture, first aid, and use of personal protective equipment (PPE). The required PPE according to the label includes long-sleeved shirts and long pants, waterproof gloves, shoes and socks, and protective eyewear. PPE is expected to mitigate potential exposure to handlers.

Exposure to handlers is anticipated for short-term (1-30 days) durations. There also may be the possibility for intermediate-term (1-6 months) handler exposure for individuals mixing, loading, and applying the glyphosate mixture to multiple fields for more than 30 days. However, the Agency does not have information pertaining to the duration of coca and poppy spray programs or number of days spent mixing, loading, and applying the glyphosate mixture.

An occupational handler exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (i.e., mixers, loaders, applicators, etc.) during use. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for dermal or inhalation short- and intermediate-term exposures. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted. No significant handler risk is expected.

### **Post-application Exposure**

According to the DoS, Colombian coca plants (Erythroxylum species) are woody perennial shrubs native to the Andean region. Coca plants have leaves with waxy cuticles which retard herbicide uptake in the plant. The coca bushes grow to approximately chest level and are harvested mainly by leaf pulling, 4 to 5 times per year. Coca plants grow from seedlings to a harvestable plant in 12 to 18 months. Representatives from DoS indicated that, growers will prune the coca plants, immediately after spraying, in order to salvage the coca crop. Specifically, since glyphosate is a contact herbicide that works systemically to kill the plant after absorption through the leaves, workers may enter fields immediately after spraying in order to prune or pull off the coca leaves in order to prevent the coca plant from dying.

In the US, most uses of glyphosate are applied to kill weeds and other non-desirable vegetation—annual and perennial grasses and herbaceous plants and woody plants and trees on crop and non-crop lands. In general, glyphosate is not applied in the US to destroy or kill the raw agricultural commodity. The intended US uses are for undesired vegetation in and around crop fields, forests, industrial areas and residential areas.

DoS states that pilots are instructed not to spray fields where people are present. Therefore, based on the use pattern described by the DoS, potential short-term dermal exposures are expected for persons pruning, or leaf pulling treated coca plants immediately after spray events. These activities are expected to result in dermal exposure from treated foliage contacting the skin. In cases such as glyphosate, where the vapor pressure is negligible, HED experience with post-

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application data suggests that inhalation exposure is minimal and therefore, HED does not quantitatively assess post-application inhalation exposure. Since poppy is sprayed at a much lower application rate than coca, potential exposures related to re-entering treated poppy field is expected to be similar or lower than those associated with the use on coca.

Intermediate- and long-term post-application exposures are not expected due in part to the fact that a coca and poppy fields are sprayed no more than twice. Additionally, glyphosate is a translocated herbicide which is rainfast (unable to be rinsed off by water) within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal. Glyphosate has no residual soil activity. Results from the first 12 months of bare ground field dissipation trials from eight sites show that the median half-life (DT50) for glyphosate (Roundup) applied at maximum annual use rates (7.95 lb a.i./acre, 10.7 lb a.i./acre) was 13.9 days with a range of 2.6 (Texas) to 140.6 (Iowa) days. Acceptable aerobic soil, aerobic aquatic and anaerobic aquatic metabolism studies demonstrate that under those conditions at 25°C in the laboratory glyphosate degrades rapidly with half-lives of approximately 2, 7 and 8 days respectively. The reported half-lives (DT50) from the field studies conducted in the coldest climates, i.e. Minnesota, New York, and Iowa, were the longest at 28.7, 127.8, and 140.6 days respectively indicating that glyphosate residues in the field are somewhat more persistent in cooler climates as opposed to milder ones (Georgia, California, Arizona, Ohio, and Texas). The climate in Colombia would favor a shorter half life than the colder regions of the US. Thereby, HED believes glyphosate would not be persistent or be available for intermediate-term or long-term post-application exposures in the Colombian climate.

A post-application exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for these durations or routes of exposure. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted. No significant post-application risk due to glyphosate exposure is expected as a result of this use.

### **Incidental Oral Exposure (Hand-to-Mouth)**

Since DoS states that pilots are instructed not to spray fields where people are present, incidental oral exposure (hand-to-mouth) resulting from being directly sprayed by glyphosate was not assessed. Also, it is not current Agency policy to quantitatively assess toddler hand-to-mouth exposure resulting from spray drift. Additionally, HED does not currently perform exposure assessments for toddler non-dietary oral exposures for agricultural scenarios. Therefore, non-dietary incidental oral exposure was not quantitatively assessed for the use of glyphosate in Colombia.

As a point of comparison, screening level risk estimates for toddler incidental oral exposures (hand-to-mouth) to the U.S. registered residential turf uses of glyphosate have been calculated. All resulting risks for toddler incidental oral exposure do not exceed HED's level of concern. The assumptions for toddler incidental oral exposures, (based on the maximum application rate of



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1.62 lbs acid equivalent (ae)/acre), are expected to be conservative. For example, it is assumed that there is no dissipation of transferable residues, so that toddlers are exposed to day of treatment residues for each day of exposure. Even though the maximum application rate for the aerial eradication program is higher (3.3 lbs ae/Acre), using the same standard screening level assumptions as used in the residential assessment for the U.S. registered turf use and taking the higher application rate into account, the potential risk would not exceed HED's level of concern.

As indicated in the turf assessment, glyphosate was directly applied to residential lawns and did not result in exposures of concern to HED. Although spray drift is always a potential source of exposure to residents nearby aerial spraying operations, AgDrift® (a spray drift model) consistently predicts drift from applications is only a fraction of the applied rate (lb ai/acre). Based on this assessment, HED believes that it is unlikely that there is a higher potential for risk of exposure to spray drift from agricultural operations.

### **G. Potential Exposure From Spray Drift**

Due to spray drift, there is potential exposure for persons in nearby areas to those targeted for spraying. Exposure through drift is not expected to exceed that which is identified in the exposure characterization provided above and in the ecological risk assessment below.

The coca eradication program operating in Colombia has incorporated several features designed to minimize the potential for off-target drift, provide quality assurance on a mission-by-mission basis, and evaluate the performance of the program to the extent possible given current conditions. Three types of aircraft are used in the program including the Ayres Corporation T65 Thrush, modified OV10D Bronco aircraft converted from military observation use to spray aircraft, and the Air Tractor AT802. The T65 and AT802 are common to the agricultural sector in the US. The nozzles are Accu-Flow as described at the April 18, 2002 briefing to the Agency. The droplet spectra characteristics, under use conditions for these nozzles, produce a very large droplet which has a volume median diameter (VMD) between 300 and 1500 microns. Use of droplets this size is consistent with minimizing spray drift in agriculture in the US. A surfactant (Cosmo-Flux 411F) is also used in the spray solution along with water and the glyphosate formulated product. The use of spray adjuvants (in this case Cosmo-Flux 411F) in pesticide product formulations and/or the spray solution is also consistent with common agricultural practices in the US.

The quality assurance standard operating procedures incorporated into the program are also consistent with standard agricultural practices. These include reconnaissance of the spray sites, use of global positioning satellite technology (GPS), and criteria for aborting missions (e.g., based on climatological conditions or presence of persons or livestock in the treatment areas). Reconnaissance of spray sites is intended to define the treatment zones through the use of sophisticated GPS mapping which is then overlaid with GPS spray records from missions to evaluate performance. GPS technology is used for planning, assessments of mission performance, and for archival purposes to evaluate potential claims against the program.

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Finally, to a limited extent where feasible, on-site ground inspections for spray efficacy and potential adverse effects are performed. Reports suggest approximately 90 percent efficacy in the spray swath and minimal collateral damage to surrounding vegetation (e.g., aerial photos of treated areas) based on information supplied by the DoS at the April 18, 2002 briefing.

The Agency did not complete a quantitative risk analysis of the drift potential of glyphosate in the water/surfactant solution used in this program. However, the technology and other safeguards used in this program are consistent with common approaches in the US for reducing spray drift. Therefore, it is likely that drift is minimized in this program if all procedures are adhered to and operational equipment is in working order. At the April 2002 briefing, it was indicated to the Agency that quantitative spray drift studies had been completed by the DoS in conjunction with the University of Georgia. These were not supplied to the Agency nor were they considered in this evaluation. Additionally, it should be noted that the information considered by the Agency were done so without review of the primary source (e.g., the method by which the VMD was determined was not described, written application protocols describing target site conditions when applications would be aborted were not provided, and methods for scoring or measuring off-target damage were not provided).

Based on information contained in the report provided to OPP in 2003 entitled Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program, it appears that there are no differences in the method used for poppy eradication significant enough from the coca eradication program, evaluated last year, that would show a cause for concern on drift related issues. By all accounts, DoS is approaching drift reduction in a systematic manner that is based on the same kinds of recommendations that would commonly be used in agriculture. It is also important to consider the drift issue in the context of concerns over human health. As indicated above in the exposure discussion, a qualitative assessment for glyphosate indicated that there were no risk concerns even for children playing in areas that have been treated at rates equivalent to those that would be expected within the treated areas. Spray drift would only lessen these exposures, again, which are already not of concern. As such, the Agency has no concern for spray drift from a human health perspective.

#### **H. Incident Data Review: A Study of Health Complaints Related to Aerial Eradication of Poppy in Colombia**

The following incident data were evaluated as part of the 2002 assessment for the use of glyphosate in the coca eradication program. Since the incidence data pertains to areas where poppy was sprayed, it is considered pertinent to the current review and is included below.

The report, prepared by the Department of Narino, Municipality of El Tablon De Gomez, makes a concerted effort to identify any health problems that might be related to use of the glyphosate tank mix in aerial eradication programs. The study was commissioned by the U.S. Embassy in Bogota and conducted independently by Dr. Camillo Uribe, Director of Clinica Uribe Cualla, the national poison control center. Sections of this report are summarized below with the sections numbered in **bold** corresponding to the original report.

An exact comparison of the epidemiological data in Colombia (which is from aerial application to poppy) relative to the conditions of use, presented at the April 18, 2002 briefing (for aerial application to coca) by DoS to OPP risk assessors, would have limitations and uncertainties. The briefing did not address the conditions of use for poppy. At that time DoS also did not provide human incident data for the coca eradication program. Subsequent to this briefing DoS did communicate that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy also differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

### **1.1 Description of studied area**

This report primarily concerns the area around the municipality of El Tablon in southern Colombia. The total population is given as 16,770, of which 89% is categorized as rural. The main crops in this area include coffee, corn, wheat, oats, potatoes, and illicit opium poppy. It is known that a variety of other pesticides, more toxic than glyphosate, are used on these crops. The municipality has three health centers, including Aponte, which is the focus of this report. The Aponte health center is staffed by a medical doctor, a nurse, and a nurse's aide. Aerial eradication of the illicit opium poppy reportedly occurred in this region in June, July, and November of 2000.

### **1.2 Morbidity and mortality in the municipality of El Tablon**

The Narino Departmental Health Institute provided summary morbidity and mortality information for the El Tablon De Gomez area and the Aponte settlement for the year 1999. Data for the year 2000 had not yet been officially released, but estimates are provided. These data are reported here to provide an approximate description of glyphosate tank mix exposure upon use on coca fields in Columbia. However, no quantitative conclusions can be drawn from these data. Six illnesses likely to be related to pesticide exposure were identified and tabulated. They include, acute diarrhea, acute respiratory infection, dermatitis, intoxication, conjunctivitis and headache. The authors note that the first three illnesses listed (diarrhea, respiratory infection, and dermatitis) are likely to be related to problems with inadequate nutrition, housing, and lack of health services. The basis for this listing of symptoms is not specified, but it does agree with the list of symptoms likely to result from exposure to glyphosate products based on Poison Control Center data, California surveillance reports, and the world literature. Total morbidity for 1999 and estimated morbidity for 2000 are given in the Table below for El Tablon De Gomez and the Aponte Settlement below. Note, however, that the overwhelming majority of these illnesses did not occur at the time of spraying and, therefore, could not be related to spray exposure.

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**Table 2. Morbidity reported in the El Tablon De Gomez of Colombia in 1999 and estimated for 2000.**

| Pathology                       | 1999  | 2000 Estimated |
|---------------------------------|-------|----------------|
| Acute diarrhea                  | 146   | 186            |
| Acute respiratory infection     | 568   | 506            |
| Dermatitis                      | 209   | 265            |
| Poisoning/Intoxication          | 1     | 4              |
| Conjunctivitis                  | 75    | 85             |
| Headaches                       | 139   | 151            |
| Total for 6 suspected illnesses | 1,138 | 1,197          |

**Table 3. Morbidity reported in the Aponte Settlement of Colombia in 1999 and estimated for 2000.**

| Pathology                       | 1999 | 2000 Estimated |
|---------------------------------|------|----------------|
| Acute diarrhea                  | 181  | 190            |
| Acute respiratory infection     | 199  | 222            |
| Dermatitis                      | 210  | 180            |
| Poisoning/Intoxication          | 4    | 4              |
| Conjunctivitis                  | 87   | 104            |
| Headaches                       | 78   | 95             |
| Total for 6 suspected illnesses | 759  | 795            |

The Aponte settlement is contained within the El Tablon De Gomez area, where there has been a concern for herbicide spraying-related health effects. The figures in the report are listed by five separate age groups. This reveals, that the majority of the cases of diarrhea and respiratory infection occurred in children less than five years old, as would be expected given the known demographics of those health effects. Nationwide data show that 53% of intoxications are suicides or suicide attempts, but it is not clear how many of the four poisonings listed above might be suicidal or, more importantly, are due to other products such as medications. In both Tables 2 and 3 there is an increase of 5% from 1999 to the estimate for 2000 for the total of the six suspected illnesses. Given that spraying is reported to have occurred in 2000 and not in 1999, this suggests that the overwhelming majority (95%) of illnesses reported would be background incidence unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the glyphosate tank mixture was responsible for these complaints.

### 1.3 Epidemiological monitoring system and mandatory notification

In addition to the summary of general morbidity in the population, there is a mandatory health reporting system in Colombia for 34 illnesses including pesticide poisonings. The review of these records found no reports of pesticide poisoning for the municipality of El Tablon in the year 2000 or the first 9 weeks of 2001. Weekly reports were examined to determine how many pesticide poisonings were reported each month. It did not appear that the times of spraying correlated with reports of pesticide intoxication.

**Table 4: Reports of Pesticide Intoxication provided to the Narino Department of Health Institute, Epidemiology Section January 12, 2000 through March 7, 2001.**

| Month/Year    | Number of Poisonings | Month/Year     | Number of poisonings | Poisonings occurring at time of spraying |
|---------------|----------------------|----------------|----------------------|--|
| January 2000  | 0                    | July 2000      | 11                   | 9  |
| February 2000 | 0                    | August 2000    | 6                    |  |
| March 2000    | 8                    | September 2000 | 12                   |  |
| April 2000    | 13                   | October 2000   | 8                    |  |
| May 2000      | 7                    | November 2000  | 13                   | 6  |
| June 2000     | 15                   | December 2000  | 2                    |  |
| --            | -                    | Jan. 2001      | 7                    |  |
| --            | -                    | Feb. 2001      | 19                   |  |
| --            | -                    | Mar. 2001      | 0                    |  |

Out of a total of 125 reported pesticide poisonings in 61 weeks, 15 occurred during 5 weeks when spraying eradication occurred. Given the variation in the data, this could easily be due to chance and be unrelated to exposure from the spraying of the glyphosate tank mixture. More work is required to determine whether locations of the 15 suspect poisoning matched the location and timing of spraying.

In 2000, the Narino Department of Health requested all municipalities to report the human health effects of pesticide spraying. Ten municipalities supplied the reports. They are:

Three municipalities including Tablon de Gomez, Barbacoas, and Magui reported no cases. However, the reports were completed prior to the November spraying in Barbacoas and Magui and prior to (or perhaps during) the July and before the November spraying in Tablon de Gomez.

Buesaco reported one patient with sore throat, numbness in limbs, and conjunctivitis in June.

In Tumaco, six case of patients with conjunctivitis and dermatitis were reported as of October 6, 2000.

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In San Pablo, 50 cases of dermatitis, conjunctivitis, respiratory conditions, and digestive problems were reported after as of October 6, 2000.

In La Cruz, two cases of allergic rhinitis, two cases of dermatitis, and five cases of conjunctivitis were reported as of October 6, 2000.

San Jose de Alban did not report any specific cases, but the scientific coordinator and chief nurse noted an increase in gastrointestinal, dermatological and respiratory conditions. The exact quantity of these conditions in relation to spray times was not given.

El Rosario reported five cases of conjunctivitis and rhinitis that might have been related to spraying carried out on July 31.

San Pedro de Cartago reported an increase in gastrointestinal symptoms but no quantitative relationship between illnesses and spray times was provided.

The absence of any reports of pesticide poisoning combined with the information from the ten municipalities is difficult to interpret. The glyphosate formulated product is known to cause irritation to the skin, eyes, mucous membranes which may account for some of the reports of sore throat, conjunctivitis, dermatitis and other conditions described above. However, it is not possible to evaluate these reports in any detail due to the lack of any information on how many of these cases experienced exposure immediately prior to their illness and lack of information on investigation of potential alternative causes. This anecdotal information does not provide any substantial evidence of health effects due to the spraying of the glyphosate tank mixture in Colombia. Many of the reports are consistent with exposure to glyphosate products by the dermal route, as reported in California and the literature. So, it is possible that some cases could be related to the aerial eradication program.

To provide context for comparison, the California Pesticide Illness Surveillance Program (1982-2000) data for glyphosate were reviewed for this risk assessment. This analysis demonstrated interesting findings. Starting in 1992, the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that the reformulated glyphosate product used since 1992, have resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to the reduction in eye injuries.

## **2.2 Review of report of January 22, 2001 visit to the municipality of El Tablon de Gomez.**

A commission visited the municipality of El Tablon on January 22, 2001 and spoke with Dr. Tordecilla and reviewed health records of his patients. A number of records of skin conditions were noted for the months of October, December 2000, and January 2001. The exact number of cases, selection criteria, and method of analysis was not specified in the summary report. Nevertheless, the commission concluded

“that the information available permitted the commission to consider only the possibility of an association between exposure to pesticides and the effects”. The commission noted that it lacked the technical expertise, the data on dates and locations of spraying, and therefore could not conclude whether the observed conditions were related to pesticide exposure.

### **2.3 Interviews with Narino department health officials regarding the spraying**

Employees of the Narino Department Health Institute were interviewed. A Fatima Health Promoter, thought the children were most affected, suffering gastrointestinal problems and eye irritation. One possible route of exposure was the village water fountains which supply some of the drinking water. The most common symptoms in children, according to the Health Promoter, were stomach aches and vomiting, which were different from the most common symptoms of glyphosate exposure reported by Lee et al. (2000), sore throat and nausea. This inconsistency suggests that some cause other than glyphosate products was responsible for the children’s complaints. The Health Promoter reported one case of a boy with skin lesions like sores after the spraying. The Health Promoter was particularly concerned that peasants receive more health care from the government.

A nurse’s aide reported that three or four patients with burning eyes, headache, and dizziness were seen at her health center. One boy with a respiratory infection was sent to another health center, later died. Medical records were sought to substantiate this report but there was no clinical history, autopsy or other information to support glyphosate spraying as a factor. She referred a patient with urinary problems to the hospital. Subsequent review of the medical records of this case did not find reference to glyphosate tank mix exposure and suggested an infectious origin. There were also cases of dermatitis, headache, abdominal pain and gastrointestinal symptoms, but she could not say whether the symptoms were related to exposure to the spraying of glyphosate tank mixture.

Another nurse’s aide reported by telephone that her impression was that the number of dermatological consultations had increased. However, there was no clear association with glyphosate tank mix exposure and many of the reasons for the consultations were the same as in previous years when glyphosate was not used, so no clear relationship between the spraying and these dermatological conditions was identified.

Reports of anecdotal evidence by nurse’s aides and the health promoter have not established a link between the spraying of glyphosate tank mix and health effects. Follow-up to determine the timing and evidence of exposure and examination of other potential causes of these effects was not performed. These interviews do not add significant evidence about the health risks from the use of glyphosate tank mixture in Colombia, more in depth study is needed.

### **2.5 Review of records of patients treated at Aponte Health Center - Sept. 2000 to Jan. 2001**

There were 29 cases reported by Dr. Tordecelli and clinical records were obtained for 21 of them. Two other reports of skin lesions were sought but could not be confirmed. After careful review of the 21 records, it was determined that all but four cases were likely due to other causes. Most had skin conditions known to be related to bacteria or parasites, not chemical exposures and the onset of their symptoms did not correspond with the times of spraying. There were seven patients whose symptoms

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started after spraying and three of these were conditions known to be caused by bacteria or parasites. For the remaining four cases possibly related to the spraying of glyphosate tank mixture, one was an allergic reaction that had been seen in this patient before when there was no spraying. A second and third case were contact eczema that is endemic in this region and thought to be more likely due to an infectious origin. One of these two cases did not initiate until 52 days after the last spraying. The fourth case was dermatitis on the thigh which would typically be protected by clothing and thereby protected from aerial spray applications. This reviewer agrees with the conclusion that “the twenty-one clinical histories . . . reveals that any relationship between aerial eradication with the herbicide glyphosate (tank mixture) and the skin conditions treated in Aponte is unlikely”.

In summary, the evidence collected and presented in this report cannot confirm that the glyphosate tank mixture used in Colombia as the likely cause of illness in the surrounding community. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, and respiratory passages and suggest that the Cosmo-Flux 411F added to the glyphosate product in Colombia has little or no effect on the overall toxicity of the formulated product.

Rather than review incomplete medical records, it would be better to collect information prospectively. For example, if pesticide poisoning is a mandatory reporting condition, a form documenting the exposure, health effects and medical data on each case could be designed and used to establish whether any particular conditions might be related to spraying the glyphosate tank mixture. Without prospective collection of data and follow up, it is difficult to evaluate potential health effects of the glyphosate tank mixture sprayed in Colombia. Better records of the time of exposure relative to the onset of symptoms would also enhance interpretation of the incidence data.

## **I. Updated Incident Data Review**

The purpose of the current review is to consider recent exposure/incident information provided to the Agency for the DoS Colombia coca and poppy eradication program in light of the 2002 assessment of reported health complaints. The “Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program” submitted this year, mentions two activities, quoted below:

“The spray program tracks human health complaints in two ways. The first is to initiate an immediate investigation, often including clinical evaluation of the patient(s), upon notice to the U.S. Embassy of a problem . . . To investigate complaints of toxic exposure allegedly caused by spraying, [the Embassy’s Narcotics Affairs Section] retains the services of two of Colombia’s leading toxicologists, including the director of Colombia’s national poison control center, the Uribe Cualla Centro de Asesoramiento Toxicologico . . . “. Subsequent to the 2002 EPA assessment, “two complaints have been reported to the U.S. Embassy. In September 2002, the Embassy received a complaint of multiple cases of poisoning from spraying coca in Puerto Asis (Putumayo department). A visit to the hospital and interviews with doctors there revealed no cases of poisoning or illness attributable to spray chemicals.”



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A detailed report on this visit was provided in the 2003 submission: “Investigative report on cases of possible human health effects in Puerto Asis” by Jorge Hernan Tobon, M.D., September 19, 2002. Review of this report confirmed that only two hospitalized cases were located that could have been the source of the complaint. One was a 13-year old child diagnosed as suffering from organophosphate poisoning, not from glyphosate exposure. And the other was a three-year old child who developed symptoms of asthma at some time after several sprayings near her village. However, the coincidental development of symptoms without supporting evidence from other sources that glyphosate might be a contributor to asthma, make this case an unlikely result of exposure to the herbicide. In the opinion of the specialist treating the child, glyphosate was not the cause of her illness.

The second prospective approach is quoted from “Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program”:

The Government of Colombia and the U.S. Embassy Bogota have also taken a proactive approach to investigating any human health concerns manifest in areas where the spraying takes place. Both governments have collaborated to create a robust Medcap to search out cases of harm to health allegedly caused by spraying. During these public health interventions that are timed to take place in areas where coca eradication has recently taken place, U.S. Embassy-contracted toxicologists talk to patients and talk to local medical personnel, looking for spray-related cases. . . .

As a result of the effort described above 1,029 patients were interviewed by Medcap medical personnel, had their medical conditions assessed, and received complimentary health care. None of the cases reviewed were found to be related to the eradication spraying program. Tabular information shows that between 120 and 260 patients were interviewed in relation to five separate spray operations. The report concluded that “Through Medcap and other medical investigations, the U.S. Embassy has never found an instance of spray-related harm to human health.”

The report also mentions a separate news report that attributed spread of tuberculosis and questioned whether case of harelip and cleft palate in newborns might be related to spraying. Given the infectious nature of tuberculosis and the known genetic factors associated with the two birth defects, the likelihood of glyphosate having any role in these illnesses is extremely remote at best. The Agency is not aware of any information linking glyphosate to cleft palate in rats or rabbits.

### **Conclusions Regarding Incident Reports**

Current information indicates that the Government of Colombia and the U.S. Embassy Bogota have adhered to the EPA advice ... “Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent occurrence.” The 2003 submission from the “Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program” to the EPA indicates that “A visit to the hospital and interviews with doctors there revealed no cases of poisoning or illness attributable to spray chemicals.” U.S. Embassy-contracted toxicologists talked to patients and talked to local medical personnel, looking for spray-related cases... The report concluded that “Through Medical Civic Action Program (Medcap) and other medical investigations, the U.S. Embassy

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has never found an instance of spray-related harm to human health.” Missing from their account was a clearly stated case definition for what would constitute a glyphosate-related poisoning. A case definition is required if the conclusion that they have “never found an instance of spray-related harm to human health” is to be supported.

It would be useful to continue these efforts and further document the manner in which follow-up is performed. Standardized collection of data on patients and their symptoms is recommended, so that future analysis can look for patterns across patients not only to identify related cases, but perhaps identify new effects previously unsuspected and that might be associated with low-level exposure to glyphosate spray drift.

## **J. Risk Characterization**

Risk characterization combines the assessments of the first three steps to develop a qualitative or quantitative estimate of the probability, that under the assumed conditions or variables of the exposure scenario, that harm will result to an exposed individual. Risk is equal to hazard multiplied by exposure. For the scenarios that are relevant to the subject use, the Agency has not identified toxic effects attributable to a single oral exposure, short- or intermediate-term dermal, or short- or intermediate-term inhalation exposures. Therefore, no quantitation of exposure or risk was performed. Nonetheless, it is appropriate to qualitatively characterize the potential for risk concerns for this use.

From the review of glyphosate product incident reports for the use on poppy, it should be emphasized that the spraying reported to have occurred in 2000 and not in 1999 suggests, that the overwhelming majority (95%) of the illnesses reported would be background incidents unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incident data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There is some data to suggest that the poppy eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on the use, timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. The evidence collected and presented in the epidemiology report cannot confirm that the glyphosate tank mixture used in Colombia as the likely cause of a single illness. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, and respiratory passages and suggest that the Cosmo-Flux 411F added to the glyphosate product in Colombia has little or no effect on the overall toxicity of the formulated product. The information so far collected indicates that any increase in health problems is likely to be relatively small at most and the severity of those symptoms is likely to be minor to moderate at most.

The Amazon Alliance and Earth Justice submission in 2002 provided little, if any, information on the number of persons affected, age and sex, symptoms of illness, or diagnosis or treatment received. Without

such information EPA cannot even begin to characterize the extent and pattern of the health effects claimed to result from glyphosate application. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

Current information indicates that the Government of Colombia and the U.S. Embassy Bogota have adhered to the advice provided by the Agency in 2002 ... “Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent occurrence.” The 2003 submission from the “Department of State Updated Report on Chemicals used in the Colombian Aerial Eradication Program” to the EPA indicates that “A visit to the hospital and interviews with doctors there revealed no cases of poisoning or illness attributable to spray chemicals.” U.S. Embassy-contracted toxicologists talked to patients and talked to local medical personnel, looking for spray-related cases... The report concluded that “Through Medical Civic Action Program (Medcap) and other medical investigations, the U.S. Embassy has never found an instance of spray-related harm to human health.”. Missing from their account was a clearly stated case definition for what would constitute a glyphosate-related poisoning. A case definition is required if the conclusion that they have “never found an instance of spray-related harm to human health” is to be supported.

It would be useful to continue these efforts and further document the manner in which follow-up is performed. Standardized collection of data on patients and their symptoms is recommended, so that future analysis can look for patterns across patients not only to identify related cases, but perhaps identify new effects previously unsuspected and that might be associated with low-level exposure to glyphosate spray drift.

The *glyphosate formulated product* currently used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* and *formulated product* indicate that both are classified as category III for primary eye irritation and category IV for acute dermal and oral toxicity, and skin irritation and are negative for dermal sensitization. The label for the *formulated product* used in the eradication program in Colombia includes the “Caution” signal word.

During April 18 briefing, the Department of State agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix used in the coca aerial eradication program. That information has been received and reviewed. In summary, the acute toxicity of the spray mixture is category III for eye irritation and category IV for skin irritation and acute dermal, oral and inhalation exposure and is negative for dermal sensitization.

## **K. Summary Conclusions**

- There are no risks of concern for glyphosate, *per se*, from the dermal or inhalation routes of exposure, since toxicity is very low.

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- The components of the adjuvant Cosmoflux 411F are not highly toxic by the oral and dermal routes; they have been approved for use in/on food by the Agency.
- Glyphosate is not highly toxic. Based on the conditions of glyphosate use described by DoS, there is likely minimal exposure or concern for acute and chronic dietary or incidental oral risks.
- Due to the change of glyphosate product used in the Colombian Aerial Coca and Poppy Eradication program and the submission of the acute toxicity tests for the tank mix, there is no longer concern for acute eye toxicity.
- Based on the information received to date for the use on poppy, exposure is expected to be similar or lower than the previously assessed use on coca.

## REFERENCES

*(information not included as it may be entitled to confidential treatment).*

HIARC Report for Glyphosate (TXR No. 0050428, 22-JAN-2002)

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Evaluation of 6 acute toxicity studies conducted on test material identified as Spray-Charlie. (DP Barcode: D289806, 13-MAY-2003)

Farmer, D.R., T.A. Kaempfe, W.F. Heydens and W.R. Kelce. 2000. Developmental toxicity studies with glyphosate and selected surfactants in rats. *Teratology* 61(6): 446.

*(information not included as it may be entitled to confidential treatment).*

*(information not included as it may be entitled to confidential treatment).*

US Environmental Protection Agency, Office of Pesticide Programs May 9, 2002: Guidance Document on Methodology for Determining the Data Needed and the Types of Assessments Necessary to Make FFDCA Section 408 Safety Determinations for Lower Toxicity Pesticide Chemicals.

Williams, G.M., R. Kroes and I.C. Munro. 2000. Safety evaluation and risk assessment of the herbicide Roundup and its active ingredient, glyphosate, for humans. *Reg. Toxic. Pharm.* 31: 117-165.

### **III. ECOLOGICAL RISK ASSESSMENT**

#### **A. Introduction**

At the request of the Department of State (DoS), the Office of Pesticide Programs (OPP) of the U.S. Environmental Protection Agency (EPA) provides here an ecological risk assessment for the aerial coca and poppy eradication programs in Colombia. The Environmental Fate and Effects Division (EFED) performed a risk assessment for coca eradication in response to a similar request by DoS in 2002. That assessment concluded that the active ingredient glyphosate itself would likely pose little risk to non-target terrestrial and aquatic animals, but that non-target terrestrial plants would likely be damaged some distance from the intended spray area due to spray drift of glyphosate.

The proposed use of glyphosate on coca will be little changed from that described in 2002, with the exception of the use of a different glyphosate product in 2003. This will reduce the potential for eye irritation, and therefore may provide some benefit to people and terrestrial animals exposed to the spray. Other aspects of the proposed use remain the same, including the use of adjuvant CosmoFlux 411F. Therefore, as detailed below, the expected risks and uncertainties in EPA's environmental risk assessment remain essentially the same as described the previous year.

The request for a risk assessment for the use of glyphosate to control poppy production is new for 2003. However, as described below, the expected risks and uncertainties corresponding to this use are nearly identical to those for the coca use. The application rate of glyphosate is less for poppies than for coca, and therefore the risk to terrestrial animals is expected to be low. The potential for glyphosate runoff may be much greater for poppies, since the sprayed fields can be located on mountainsides. However, as detailed in the 2002 assessment for coca eradication, the concentration of active ingredient glyphosate that might be derived even from direct application to a small pond should not result in significant risk to non-target aquatic animals or plants. Therefore, runoff from the poppy or coca sprays would not be expected to pose a significant risk to non-target aquatic organisms.

The primary risk that might be associated with the poppy eradication program is that from spray drift to non-target terrestrial plants. As with coca applications, application to poppy fields will require application at speeds and application heights greater than might be desirable for drift control, due to the safety precautions needed for eradication sprays down a potentially forested mountainside. The added factor of steep slopes make it likely that spray drift from the lower rate poppy sprays could extend a greater distance than that from the coca eradication sprays which are understood to occur on more level terrain.

#### **B. Ecological Risk Characterization**

The following risk characterization for the coca eradication use is adapted from the 2002 ecological risk assessment for the use of glyphosate herbicide as part of the U.S. supported aerial eradication program of coca in Colombia:

The use of a glyphosate spray for coca and poppy eradication is unlikely to cause adverse effects to

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terrestrial or aquatic animals but is likely to pose a substantial risk to nearby non-target plants. Vegetative vigor toxicity laboratory tests performed using a formulated glyphosate product (glyphosate acid WP 48.3%) on North American crops indicated toxicity to terrestrial plants with applications of less than 1.0 lb of the isopropylamine salt of glyphosate per acre, which corresponds to 0.75 lb acid equivalents (a.e.) per acre. The coca use rate is 1.11 gallons glyphosate/acre (3.34 lb acid equivalents/acre) for direct, aerial application to coca. A second application is possible if fields are replanted, or the first is determined after 3 to 6 months to have been inadequate. Because poppies are reportedly more sensitive to glyphosate, a lower application rate of 0.27 gallon/acre (0.8 lb a.e./acre) is used in spraying for poppy eradication. The DoS reports that the spray mixture for poppy eradication would include 5% formulated glyphosate, 1% Cosmo-Flux 411F, and 95% water (as opposed to 44%, 1% and 55%, respectively for the coca spray). The product claimed by the DoS to be used in Colombia is widely used in the US on a variety of agricultural commodities and non-agricultural sites.

EPA used the AgDRIFT model to estimate potential spray drift. The model suggests that non-target plants hundreds of feet away may be exposed to a fraction of glyphosate applied to coca or poppy fields. Some of the important application parameters for estimating spray drift levels from coca and poppy eradication application are shown in Table 1.

Table 1. Important application parameters for defining off-target spray drift levels in coca and poppy eradication.

| Application parameter           | Coca spraying     | Poppy spraying   | Effect on off-target exposure   |
|---------------------------------|-------------------|------------------|---|
| Application rate                | 3.34 lb a.e./acre | 0.8 lb a.e./acre | Lower application rates result in lower off-target exposure   |
| Flight speed during application | 200 mph           | 135-145 mph      | Lower flight speeds result in less secondary droplet break up, larger droplets, less drift, and lower off-target exposure |
| Estimate wind speed range       | 0-10 mph          | 0-4 mph          | Lower wind speeds results in less movement of spray droplets off-target (i.e. lower drift)                                |
| Estimated droplet size range    | 300-1500 mm       | 300-1000 mm      | Larger droplets are less prone to be blown off-target   |
| Estimated release heights       | <100 feet         | 30 -120 feet     | Lower release heights result in shorter fall times for droplets and less opportunity to be blown off-target               |
| Boom width                      | not available     | 70% of wingspan  | Narrow boom widths result in fewer droplet being caught in wing tip vortices and lower drift levels                       |
| Slope                           | not available     | not available    | Drift can be carried farther when winds are blowing down steeper slopes   |

Figure 1.

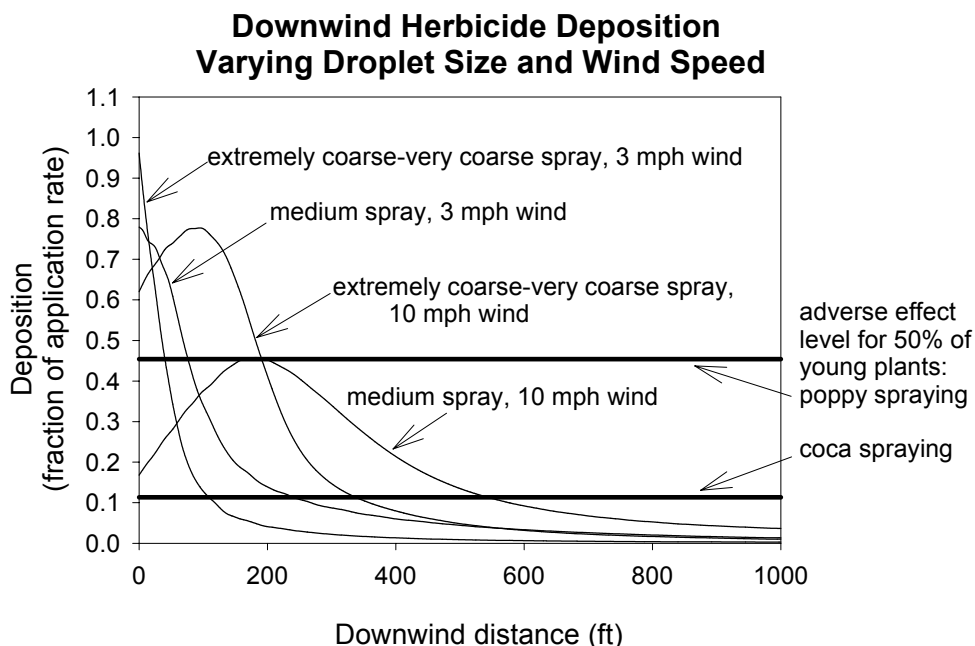


Figure 1 shows the lowest levels of drift are associated with applications using the extremely coarse to very coarse sprays at a 3 mph wind speed. The highest levels of drift are associated medium sprays at wind speeds of 10 mph. Downwind deposition levels from coca and poppy spraying is likely to be bounded by these estimates. The “effect level for 50% of young plants” is based of glyphosate toxicity studies on ten young crop plants. Older plants are generally less sensitive to herbicides than young, rapidly growing plants. At the level corresponding to approximately 11% and 44% of the coca and poppy application rates, respectively, 50% of plants species would be expected to show measurable reductions in dry weight. With a 10 mph wind, plants would be expected to be exposed at this 50% affect level up to 200 feet downwind of poppy spraying and 550 feet downwind of coca spraying. Of the affected plants some would likely recover while more sensitive plants may die, have reduced reproductive success, or reduced yields (crop plants).

There is uncertainty whether crops or other plants in Colombia, whether similar to crops tested in the US or not, would be affected similarly at the same exposure levels. However, since glyphosate is an effective, broad spectrum herbicide, risk to non-target plants outside of the application zone would be expected. The Agency’s Ecological Incidents Information Sytem (EIIS) database includes several hundred reports of possible non-target plant incidents in the US attributed to use of glyphosate.

The use of the active ingredient glyphosate itself in poppy and coca eradication would not pose a significant direct risk to terrestrial or aquatic animals, although secondary adverse effects from the loss of habitat in the spray area are likely. Neither acute nor chronic adverse effects were observed in mammalian and avian laboratory toxicity tests submitted to the EPA by US industry, using the active ingredient alone.

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Mortality was observed in fish and aquatic invertebrate studies. However, the resulting acute LC<sub>50</sub> values (concentrations at which half the test animals died), and lowest effect levels for chronic effects, were in parts-per-million. Toxicity endpoints for aquatic plants also ranged from 0.85 to 39.9 ppm. Considerably lower surface-water exposure, in the parts-per-billion, could be expected from the use on coca or poppy using runoff simulations from Agency exposure models PRZM and EXAMS. The Agency considered an even more conservative scenario, estimating the concentration that would result from the direct application of 3.75 lb acid eq./acre of glyphosate to a 1-acre, 6-foot deep pond. The calculated maximum concentration of 230 ppb is well below the toxicity values measured for aquatic organisms in the laboratory.

It is possible that much greater exposure could occur from direct overspray of water bodies much smaller than a 1-acre, 6-foot deep pond, but such simulation is not a standard component of Agency risk assessments. The product label for glyphosate prohibits such direct overspray of water bodies, but it is possible that some ecologically important water bodies too small or ephemeral to appear on maps could be sprayed directly in a project as large as the coca eradication program.

Although the measured toxicity and estimated exposure indicate that only non-target terrestrial plants are likely to be adversely affected by the use on coca and poppy, there are important uncertainties that should be considered. One of these is the extrapolation of North American data to the conditions and wildlife found in Colombia. The toxicity of a pesticide to different classes of animals and plants can vary widely among species within an individual ecosystem. The Agency uses the test species as surrogates for other North American species not tested, but has little experience with tropical flora and fauna. Similarly, laboratory and field estimates of the environmental fate of pesticides, including potential surface-water contamination, are performed with North American soils, hydrology and climate data. The uncertainty of extrapolating North American exposure and effects data to this risk assessment would most effectively be reduced by identification of characteristics which define sensitive tropical ecosystems.

An important uncertainty in this risk assessment concerns differences in the tank mix used in Colombia from those used in the US. The Agency does not have ecological toxicity information on adjuvant Cosmo-Flux 411F, which is neither manufactured nor sold in the US. However, all of the individual components (surfactants) which comprise the adjuvant are substances with low oral and dermal mammalian toxicity. The toxicity of the blend of these surfactants is not known; although the Agency often requires formulation toxicity data for non-target plants and aquatic organisms, tank-mix adjuvants are not required to be included in these studies.





**Annex 53-C**

**DEPARTMENT OF STATE MEMORANDUM OF JUSTIFICATION CONCERNING THE  
SECRETARY OF STATE'S 2004 CERTIFICATION OF CONDITIONS RELATED TO AERIAL  
ERADICATION OF ILLICIT COCA AND OPIUM POPPY IN COLOMBIA, 2004**

*(U.S. Department of State)*





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## Memorandum of Justification Concerning the Secretary of State's 2004 Certification of Conditions Related to the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

Washington, DC

2004

The Andean Counterdrug Initiative section of the Consolidated Appropriations Act, 2004 (Public Law 108-199) lays out conditions under which assistance using funds appropriated under the Andean Counterdrug Initiative may be made available for the procurement of chemicals for use in aerial eradication of illicit crops. In particular, Public Law 108-199 provides:

"That not more than 20 percent of the funds appropriated by this Act that are used for the procurement of chemicals for aerial coca and poppy fumigation programs may be made available for such programs unless the Secretary of State, after consultation with the Administrator of the Environmental Protection Agency (EPA), certifies to the Committees on Appropriations that: (1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by the EPA for this program, and with the Colombian Environmental Management Plan for aerial fumigation; and (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment: *Provided further*, That such funds may not be made available unless the Secretary of State certifies to the Committees on Appropriations that complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims: *Provided further*, That such funds may not be made available for such purposes unless programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for fumigation: ♦."

This memorandum provides justification for the Secretary of State's determination and certification to Congress that the above conditions have been met as required. In 2002 and 2003, the Secretary of State determined and certified to Congress on similar conditions concerning human health and environmental safety issues related to the Colombia spray program. These certifications were based on, among other information: all available scientific data on glyphosate, the herbicide used by the program; toxicological tests of the spray mixture (water, glyphosate, and a surfactant); active field verifications and complaint investigations; comprehensive human health monitoring; and thorough verbal and written consultations on the spray program with USDA and EPA. Because the Colombia aerial eradication program has not made any changes in the chemical formulation or application methods used for eradication of coca and opium poppy since the Department of State last submitted documents to EPA for the 2003 consultation (April 9, 2003), these prior certifications serve as the foundation for the 2004 certification. These certifications and attachments can be found on the Internet at the following address:

<http://www.state.gov/p/in/rls/rpt/aeicc/>.

On **September 27, 2004**, the Secretary of State wrote U.S. Environmental Protection Agency (EPA) Administrator Leavitt to request written consultation concerning the U.S.-supported Colombia eradication program. This letter is included as **Attachment 1**. Specifically, EPA was asked to advise the Department of State about whether the herbicide mixture employed by the U.S.-supported program of aerial eradication of coca and opium poppy in Colombia is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by the EPA for this program; whether the herbicide

mixture is being used in accordance with the Colombian Environmental Management Plan for aerial fumigation; and whether this herbicide mixture, in the manner it is being used, poses unreasonable risks or adverse effects to humans or the environment.

The Department met with EPA on **September 6, 2004** to brief EPA on the expanded monitoring of possible environmental and human health issues related to the program since the 2003 EPA Analysis. The Secretary of State's **September 27, 2004** letter provided EPA a written document -- "2004 Department of State Report to EPA on Human Health and Environmental Monitoring Related to the Colombian Illicit Crop Eradication Program" -- with further information on the issues discussed in the briefing. This document is included as **Attachment 2**.

On **November 17, 2004**, EPA Administrator Michael O. Leavitt responded to the Secretary of State with the results of EPA's consultation review. That letter and the attached document from the Office of Pesticide Programs, "Details of the 2004 Consultation for the Department of State Use of Pesticide for Coca and Poppy Eradication Program in Colombia" are included as **Attachment 3**. The next six sections directly address the requirements and concerns of Public Law 108-199.

**1. The herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States.**

EPA told the Department of State in its recent 2004 report that "Application rates for both coca and poppy eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States." (**Attachment 3, Section B**). This is the same finding they reached in the 2003 report, when the EPA stated, "EPA has determined that application rates for both coca and poppy eradication in Colombia are within the parameters listed on U.S. labels." This determination meets the criteria for the Secretary to certify that the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States.

**2. The herbicide mixture is being used in accordance with any additional controls recommended by the EPA for this program.**

The Government of Colombia and the Department of State have implemented several changes in the program to address EPA's recommendations made in the 2003 EPA analysis as evidenced by the EPA's statement in its 2004 report, "The DoS and the Government of Colombia made modifications and enhancements to the spray program as EPA recommended in its prior assessments." In 2003, the EPA recommended in its Executive Summary, "that the Department of State continue programs for investigating health complaints. The Agency also requested that the Department of State improve its definition of glyphosate poisoning, provide further documentation of its investigations and how they are conducted, and standardize data collection."

The Department of State has expanded its efforts to track reported health complaints and to investigate any possible connection between verified spraying of illicit crops and damages purported in any such complaints. The U.S. Embassy continues to conduct immediate investigations in the field upon notice to the U.S. Embassy of a problem. To date, no relation of reported human health problems to spraying has been substantiated by the rigorous evaluations of toxicologists hired by the Embassy's Narcotics Affairs Section (NAS).

The U.S. Embassy is aware of just one alleged human health related complaint since submission to Congress of the FY 2003 Spray Certification. This complaint alleged human health (and legal crop) damage from spraying of coca in Orito (Putumayo Department) and was reported in Colombia's leading daily newspaper, "El Tiempo" on May 10, 2004. The Colombian National Police (CNP) and the U.S. Embassy immediately responded by sending a verification team to Orito on May 11 to speak with the individuals interviewed in the newspaper article.

This team, composed of representatives from the CNP and NAS, an Embassy-hired toxicologist, the Government of Colombia's Alternative Development Agency (PDA), and local government representatives, found that the allegations were unfounded and that interviewees misled the reporter to discredit the spray program and discourage further law enforcement activity against illicit crops in the area. A May 12 letter from the PDA Alternative Development Director to NAS thanking the Embassy for its rapid attention to this complaint is included as **Attachment 4**.

NAS is collaborating with the Colombian National Institute of Health (INS) on a program to identify health effects of herbicides and pesticides, including glyphosate, in populations located in coca growing regions across Colombia. A NAS-contracted toxicologist helped INS prepare and conduct training for physicians and environmental health personnel who serve the populations of these areas.

The training consists of a weeklong workshop that covers toxicology, classification of pesticides, prevention, diagnosis and recognition of pesticide poisoning, clinical management, epidemiological considerations and

procedures for the study of an outbreak, glyphosate toxicological facts, and a risk assessment of aerial application of glyphosate for people and the environment. In 2004, the following workshops took place, training a total of 571 rural health care providers:

| DEPARTMENT                      | DATE          | PROFESSIONALS | TECHNICIANS |
|---------------------------------|---------------|---------------|-------------|
| Tolima                          | 13-16 January | 26            | 40          |
| Guajira, Magdalena, Santa Marta | 23-28 July    | 88            | 69          |
| Santander                       | 23-27 August  | 30            | 100         |
| Boyacá                          | 8-12 November | 100           | 120         |
| <b>TOTALS</b>                   |               | <b>242</b>    | <b>329</b>  |

The Department of State and the Government of Colombia are currently implementing the 2003 EPA recommendations. The Department of State, in conjunction with the Government of Colombia (GOC) National Institute of Health, has improved its definition of glyphosate poisoning and standardized the process of data collection. NAS Bogotá and the Government of Colombia (GOC) National Institute of Health have developed and distributed standardized data collection worksheets and a definition of glyphosate poisoning in the workshops referenced above.

The Government of Colombia and the U.S. Embassy Bogotá have also taken a proactive approach to investigating human health concerns manifested in areas where spraying takes place. Both governments have collaborated to create a robust Medical Civic Action Program (Medcap) to search out cases of harm to health allegedly caused by the spraying. These public health interventions are timed to take place in areas where coca eradication has recently taken place and thus serve as a verification of the status of public health in areas where the CNP sprays. U.S. Embassy-contracted Colombian toxicologists talk to patients as well as to local medical personnel, looking for spray-related cases.

As outlined in the chart below, 22,263 patients made themselves available for Medcap medical personnel, had their medical conditions assessed, and received complimentary health care. Although Medcap personnel have encountered several cases that were allegedly spray-related, their reviews of these cases have determined that, in each case, the conditions were caused by events unrelated to aerial eradication. Through Medcap and other medical investigations, the U.S. Embassy has still not yet found a single instance of spray-related harm to human health. This is an ongoing program and several Medcaps are planned for upcoming months.

| Place and Date                | Patients Assessed                         |
|-------------------------------|---|
| 27-28 Feb 2004<br>Arauca City | 2,000 civilian patients                   |
| 26-27 March<br>Arauca City    | 2,100 civilian patients                   |
| 17-18 April<br>Saravena       | 1,453 civilian patients                   |
| 20-22 April<br>Arauca City    | 1,572 farm animals<br>treated on 49 farms |
| 15 May<br>Arauca City         | 1,105 civilian patients                   |
| 15-16 May<br>Montañita        | 2,800 civilian patients                   |

|                         |  |
|-------------------------|--|
| 22-23 May<br>Saravena   | 1,915 civilian patients                        |
| 5 June<br>La Antioquena | 687 civilian patients                          |
| 12-13 June<br>Florencia | 3,493 civilian patients                        |
| 9-10 July               | 1,668 civilian patients                        |
| 14-15 Aug               | 2,354 civilian patients                        |
| 21-22 Aug               | 1,089 civilian patients                        |
| 18-19 Sept              | 1,599 civilian patients                        |
| <b>Totals</b>           | 22,263 civilian patients<br>1,572 farm animals |

The only changes suggested by the EPA in its 2004 report are minor and relate to improving the data collection form used to collect information on reports of damage to human health. They are as follows:

- **General Data:** Record date and contact information about the health care provider (who fills out the form) in case follow-up consultation is needed
- **Characterization of the Exposure:** Record more information about the location of exposure and any description about the proximity to the spraying (how far away) or amount of exposure (e.g. amount of skin exposed, eyes exposed, etc.).

The NAS in the U.S. Embassy in Bogota will be following up with the appropriate GOC officials to ensure that these suggestions are incorporated into the overall Aerial Eradication Program.

### **3. The herbicide mixture is being used in accordance with the Colombian Environmental Management Plan for aerial fumigation**

On July 26, 2004 the Minister of the Environment, Housing, and Territorial Development, the Government of Colombia entity charged with supervision of the Environmental Management Plan for aerial eradication (EMP), ruled that the illicit crop eradication program is being conducted in compliance with the EMP. That Ruling No. 707, an English version of which is enclosed as **Attachment 5**, reads:

"The entities responsible for executing the Illicit Crop Eradication Program Using Aerial Spraying with the Herbicide Glyphosate ♦ PECIG ♦ are currently complying with the measures established in the Environmental Management Plan imposed by this Ministry, the purpose of which is preventing, mitigating, controlling, offsetting, and correcting any possible negative environmental effects or impacts which might result from eradicating illicit crops (p. 26)."

The Department of State provided EPA the English language version of the EMP in late 2003. EPA responded to the Department of State in a February 23, 2004 letter: "We believe the Plan contains appropriate types of activities for a pesticide spray program. The information in the EMP is generally in agreement with information provided to EPA for the previous consultations and discussed in EPA ♦s 2002 and 2003 written assessments." This letter is found in **Attachment 6**.

The Government of Colombia ♦s Ministry of the Environment, Housing, and Territorial Development ♦s ruling meets the criteria for the Secretary to certify that the herbicide mixture is being used in accordance with the Colombian Environmental Management Plan for aerial fumigation.

### **4. The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse**

## effects to humans or the environment

The Secretary of State determined and certified in 2002 and 2003 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. Since the 2003 certification, the Department has responded to EPA recommendations (per section 2) with adjustments that have strengthened spray program controls to ensure increased protection against adverse effects to humans and the environment.

In the 2004 EPA report, EPA offers the following assessment of human health concerns related to the spraying of coca and opium poppy in Colombia: "Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place." EPA also concluded, "that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent." A significant number of health care providers have received training and additional training is under way or planned.

As recognized in the 2003 report, the eradication program lowered its potential risks to wildlife and has responded appropriately to minimize off target drift. However, in the 2004 report the Agency stated, "Spray drift and potential side effect down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses." In 2003, EPA recognized that the Department of State was employing "Best Management Practices to minimize drift." The Department of State continues to follow these Best Management Practices and is ever vigilant regarding the manner in which the herbicide is applied.

The Government of Colombia regularly conducts studies to assess the spray program's environmental impact through ground truth verifications to estimate spray drift and the accuracy of the spray mixture application, and during verification of all legitimate complaints about alleged spraying of crops or vegetation that are not coca or opium poppy. After the most recent verification, the Government of Colombia's Ministry of Environment, Housing, and Territorial Development characterized spray drift in the following fashion:

The drift effects that were observed in areas visited on a random basis were temporary in nature and small in extent, and basically consisted of partial defoliation of the canopy of very high trees. No complementary collateral damage from spraying activities was observed at the sites selected and verified. In sprayed areas that were subsequently abandoned, it was noted that vegetation was starting to grow again, the predominant types being grasses and a number of herbaceous species (**Attachment 5**, p. 4)

As part of the spray program's compliance with the Government of Colombia's Environmental Management Plan for the Aerial Eradication of Illicit Crops (EMP), NAS and the Government of Colombia conduct analyses of soils and water in areas where coca is sprayed. The purpose of these studies is twofold. Initial tests determine the levels of glyphosate and AMPA (amino-methyl phosphonic acid - the principal metabolite of glyphosate and an indicator of the natural degradation of that herbicide in soils) to understand the persistence of glyphosate in the Colombian soil and water in sprayed areas. In addition, further studies assess the physio-chemical properties of the samples (percentages of sand, clay, and mud, pH level, percentage of interchangeable acid saturation, total phosphate and useable phosphate content, percentage of organic material, total nitrogen level, cationic interchange capacity, mineralization index, and nitrate, ammonium, calcium, magnesium, potassium, and sodium content).

These studies increase the public's understanding of glyphosate's transformation and rate of decay in Colombian soil and help answer questions about any significant modification of the properties of the soil associated with the spray program. The soil analyses determined that soils contained acceptable levels of glyphosate and AMPA even shortly after spraying, that glyphosate degrades over time in Colombian soils, and that there are no appreciable significant changes in the properties of the soil due to the glyphosate used by the spray program.

Soil and water samples were collected in the field by an inter-agency committee of Government of Colombia agencies, including the Ministry of Environment, Housing, and Territorial Development (MMA), the Institute of Agriculture and Husbandry (ICA), the National Directorate of Dangerous Drugs (DNE), and the Colombian National Police (CNP). The laboratory studies were conducted by three different labs: the USDA Agricultural Research Service (USDA-ARS) laboratory at the University of Mississippi conducted glyphosate and AMPA analysis in soils; the Government of Colombia's Augustín Codazzi Geographic Institute (IGAC) National Soils Laboratory Division conducted physio-chemical analysis of soil samples, and the Government of Colombia's National Institute of Health (INS) conducted glyphosate and AMPA analysis of water samples.

After review of the test results and protocols for soil and water sampling, EPA responded in 2004 by saying, "similar to the results of previous Agency assessments, no risks are predicted for aquatic animals and plants,



based on exposure to residual glyphosate or AMPA in water bodies contiguous to or near coca crops."

For the 2003 Spray Certification, the Department had laboratory toxicity tests performed on the entire spray mixture, which tested at an acceptable Category III for eye irritation and Category IV for all other categories (on EPA's scale of I-IV with IV being the least toxic). Since that time, the spray program has increased its environmental and human health monitoring program and the Government of Colombia's Environmental Ministry has determined that the spraying complies with the Ministry's Environmental Management Plan for aerial eradication.

The Department of State believes that improvements over the last year have significantly decreased the likelihood of adverse impacts of eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

**5. Complaints of harm to health or licit crops caused by such fumigation are investigated, and fair compensation is being paid for meritorious claims**

The methodology for investigations into human health problems allegedly tied to spraying is covered in section 3 above. Therefore, this section focuses exclusively on complaints of spray damage to legal crops. The Government of Colombia is investigating and resolving these complaints more swiftly than in past years and continues to compensate all meritorious claims fairly.

On October 4, 2001, the GOC formally instituted a new process to compensate growers for legal crops sprayed in error. Since that date, the Colombian National Police, Anti-Narcotics Directorate (DIRAN), the Government of Colombia agency responsible for complaint investigations, has received 5,065 such complaints.

In 2004, the DIRAN's complaint investigations unit and other GOC entities that play a role in complaint investigations made substantial progress in eliminating the existing backlog of cases to be investigated and resolved. In calendar year 2004, although only 632 new complaints were received (through October), 2,725 complaint investigations were completed. Of these investigations in 2004, only four complaints were found to be valid and compensation payments were made, for a total of \$3,846. Four more cases of compensation are due to be paid in November. To date, the spray program has compensated growers in 12 cases for a total of \$30,000 of compensation.

Although most of the investigations of filed complaints have been completed, 1063 are currently being processed and verified. Complaint resolution is a rolling process; on-site investigations continue, and compensation is being paid to cases with merit. Typically, compensation hinges on the issues of whether planes sprayed in the vicinity of a farm within a five-day window of the alleged date of spraying; whether the complainant owns the farm he/she claimed was sprayed; whether the legal crop allegedly sprayed was intermixed with illegal crops; and whether the affected crop suffered damage from the glyphosate, as opposed to fungus, insects, or other causes.

Police and agronomists from the Colombian Institute of Agriculture and Husbandry (ICA), Ministry of Environment, and Office of Alternative Development conduct a site visit and the aviation computers are checked for spray operations in the area. If the spray pilots have erred and accidentally sprayed licit crops, compensation is paid to the farmer for the loss of the crop, based on current market value of the crop.

Field verification is extremely dangerous and resource intensive; and it is a slow-moving process. Because of the high risks involved for the Embassy personnel, agronomists, lawyers, DNE representatives, CNP officials, and ombudsman's representatives who accompany on site visits, the primacy of security will dictate the pace of investigations in the future. Although logistical considerations (security concerns, personnel availability, and helicopter resources) are part of the reason why complaints cannot be resolved in the field more quickly, the greatest logjam in this system is the number of false complaints which handicap the ability of field investigators to close cases more quickly. During 2004 site investigations, some farmers related stories of armed narco-terrorist groups forcing them to damage their own crops and falsifying complaints in order to publicly denounce the aerial eradication program.

False complaints -- cases in which growers complained that their legitimate crops were sprayed, but investigators who reached the fields in question found them to be coca or legitimate crops interspersed with coca -- waste resources that otherwise might be used in the service of the farmers who really deserve compensation. To date, less than half of one percent of the cases that have been visited by complaint verification teams has merited compensation. Nevertheless, Embassy Bogotá has taken steps to make sure that the overall complaint resolution is swifter and continues to pursue rapid field verifications when security, weather, and logistical considerations in individual cases permit.

The Colombian Ministry of Justice has refined the claims procedures, seeking to streamline the process and to deter fraudulent claims. These procedures will include a warning that a complainant found to have coca growing

in fields that he claims were legal crops would be subject to prosecution for violations of Colombian law. The Colombian national Directorate of Dangerous Drugs (DNE) has been ordered to begin confiscating farms of coca growers. Presumably, this will reduce the huge number of false claims that have flooded the complaint system, making investigation of and restitution for genuine claims very difficult.

**6. Such funds may not be made available for such purposes unless programs are being implemented by the USAID, the GOC, or other organizations in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for spraying**

Thus far, in calendar year 2004, the Colombian aerial eradication program has sprayed (or anticipates spraying) coca in the departments of Putumayo, Nariño, Guaviare, Meta, Bolívar, Cauca, Norte de Santander, Vichada, Antioquia, Vaupes, Córdoba, Caldas, and Arauca and opium poppy in the departments of Cauca, Huila, Tolima, Nariño, Cesar, and La Guajira. In each of these areas, USAID, the GOC, and/or other organizations are implementing alternative development programs to provide legal income generating opportunities to illicit crop growers who agree to accept benefits after eradicating their crops of coca or opium poppy.

For the purposes of this report, the Department of State interprets the term "area" as a Colombian department. This is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components cannot always be co-implemented in every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca and opium poppy are often cultivated in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than those for illegal merchandise. Dispersing development activities to remote areas often raises costs and security risks, while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils, inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of the 2004 Consolidated Appropriations Act, narcoterrorist and paramilitary groups operate in many illicit crop-growing zones and make the presence of alternative development projects inadvisable in such locations. These narcoterrorist groups reap immense profit from the illegal trade, pose grave security risks for development personnel, and slow down project implementation.

Despite these obstacles to alternative development in Colombia, USAID and the GOC are moving forward with a robust alternative development program in coca and opium producing areas. Now in the fourth year of Plan Colombia alternative development coordination with the GOC and the third year of project implementation, USAID's alternative development program has supported a total of 55,071 hectares of licit crops, 25,820 hectares of forest land, and completed 874 infrastructure projects in coca and poppy growing areas through September 30, 2004. These efforts have benefited 44,015 families. These achievements in each category have surpassed program goals. Equally important, USAID has strengthened a total of 227 NGOs, cooperatives, and national institutions so that alternative development and community building activities will be more sustainable.

The alternative development projects being carried out by USAID and GOC organizations in each area where the spray program eradicates illicit crops are described below.

**Antioquia**

An \$18.5 million USAID project directed at alternative development, implemented by the Pan-American Development Foundation (PADF), supports short-term production activities for immediate income and employment needs. It also seeks to establish longer-term crops such as natural rubber (caucho) and cacao to provide sustainability, as well as complementary productive infrastructure. Projects of cacao, caucho, and agro forestry would cover an area of 2,017 hectares and would benefit 594 families in El Bajo Cauca.

An \$8.5 million USAID Dairy project is carried out by Land O'Lakes (LOL) to promote sustainable dairy production, processing and marketing involving small farmers. This program is also operating in Nariño.

USAID also funds an activity titled Aid to Artisans (ATA), which is carrying out a \$4.3 million project to strengthen local capacity for production and marketing of crafts. ATA is also operating in Atlántico, Boyacá, Caldas, Cauca, Cesar, Córdoba, Huila, Magdalena, Nariño, Quindío, Santander, Sucre, Tolima, and Valle del Cauca.

USAID's successful \$38 million Colombia Agribusiness Partnership Program (CAPP), implemented by Associates in Rural Development (ARD), is promoting private sector agricultural production. In Antioquia, the program supports small farmers in producing fruit for processing into pulp, jute and African palm. It also

promotes forest policy reforms and improved production, processing and marketing of forest and wood products to increase incomes. The program also operates in Atlántico, Bolívar, Caldas, Casanare, Cauca, Cesar, Córdoba, Guajira, Huila, Magdalena, Nariño, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

The \$23 million Colombia Forestry Development Program (CFDP), funded directly by USAID and implemented by Chemonics, has a nucleus in Northeastern Antioquia where it is focusing on promoting pine plantations and efficient industrial processing models. It has another nucleus along the Atrato River and Uraba region that provides assistance to natural forests, agro forestry schemes, plantations and the Familias Guardabosques nucleus in Turbo and Necoclí. The estimated CFDP investment in Antioquia over the life of the project totals \$6,050,000. A portion of this assistance directly benefits indigenous communities in Mutata and Chigorodo.

USAID's \$12 million Colombia Enterprise Development (CED) project supports small and medium enterprise development in secondary cities. CED is also operating in Atlántico, Caldas, Quindío, Risaralda, Santander, Valle del Cauca, and Tolima.

The Colombian Government's Investment Fund for Peace (FIP), a \$19.4 million investment, is generating employment through infrastructures, licit crop production (coffee rehabilitation, agro forestry), skills training, and education/nutrition aid to poor families.

### **Bolivar**

The aforementioned CFDP, financed by USAID, has a nucleus along Magdalena River focusing mainly on plantations such as Eucalyptus. CFDP investment in the nucleus totals approximately \$2 million, of which an estimated \$1 million will go to Bolivar.

USAID's alternative development program carried out by PADF is supporting short cycle production activities to address immediate income and employment requirements; longer-term crops such as natural rubber and cacao to provide sustainability; and complementary productive infrastructure. The project supports 2450 hectares of licit crops benefiting 661 families.

ARD/CAPP is also promoting private sector involvement with farmers to produce cacao, African palm, and yucca (cassava).

The GOCs active in Bolivar supporting licit production activities such as palm oil and cassava production.

### **Caquetá**

USAID's centerpiece Colombia Alternative Development (CAD), implemented by Chemonics, is a \$97.3 million project fostering short-term crop production for food security and long-term income generation activities such as rubber production. Similar activities are in operation in Cauca, Norte de Santander, Tolima and Putumayo.

USAID funds a \$1.8 million Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team (ACT) to assist Colombian indigenous communities in food security, health, local governance, and land management. Activities under this program are also being carried out in the departments of Putumayo and Vaupés. The GOC is also supporting institutional strengthening for small-scale brown sugar producers and life plans (planes de vida) for indigenous communities.

### **Cauca**

USAID's CAD activities support small-scale irrigation for the production and marketing of short-season, high-value crops and value-added processing of wood products from tree plantations in indigenous areas.

The CFDP invested approximately \$100,000 in natural forest management in the municipality of Guapi in Cauca to benefit Afro-Colombian communities.

USAID Alternative Development activities also include a \$9.8 million project, implemented by ACDI/VOCA, which promotes specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The CAPP project is supporting private sector investments in hot peppers, jute, and cacao.

The Aid to Artisans project is enhancing local capacity for production and marketing of crafts as licit income generating alternatives.

The GOC is supporting fruit production and complementary activities for the coffee renewal program.

### **Caldas**

USAID ♦s Specialty Coffee program is also promoting specialty coffee production, processing, and marketing in Caldas ♦s illicit crop growing areas.

The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

#### **C ♦ sar**

The Aid to Artisans project is carrying out activities to strengthen the production and marketing of crafts.

The CAPP program is supporting private sector investments for small farmers producing crops such as cacao, fruits and African palm. The GOC is also supporting cacao and oil palm production in this region.

#### **C ♦ rdoba**

The Aid to Artisans project is supporting the strengthening of local capacity to produce and market crafts by artisans in the department.

The CAPP program is supporting private sector activities in cacao and passion fruit production.

#### **Guajira**

The CAPP is supporting private sector activities in crops such as passion fruit and cacao.

#### **Guaviare**

The GOC is supporting rubber (caucho) production and agro forestry.

#### **Guainia**

The GOC is providing institutional strengthening to indigenous community associations.

#### **Huila**

USAID ♦s Specialty Coffee project is promoting specialty coffee production, processing, and marketing in poppy growing areas.

The CAPP program is supporting cacao and fruit production, while the Aid to Artisans project is promoting the production and marketing of crafts.

The GOC is supporting the strengthening of cultural values in indigenous communities, fruit production, fishponds, and complementary activities for the coffee renewal program.

#### **Magdalena**

The CFDP has a forestry nucleus along the lower Magdalena River focusing mainly on plantations such as Eucalyptus. CFDP investment in the nucleus totals approximately \$2 million, of which an estimated \$500,000 will go to Magdalena.

USAID ♦s CAPP is also providing technical and financial support in Magdalena to private sector initiatives to produce African palm, banana, cacao, and exotic fruits.

#### **Meta**

The GOC is supporting activities in cacao, cassava, buffer zones in natural parks, and technical assistance for local governments.

The USAID CAPP program is promoting private sector investments with small farmers to produce African palm.

#### **Nari ♦ o**

The Specialty Coffee project is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Nari ♦ o.

CFDP has a forestry nucleus along three river systems in Nari ♦ o focusing mainly on community-based natural forest management. CFDP investment in the nucleus totals approximately \$1.8 million and directly benefits the Afro-Colombian community.

The United Nations Office on Drugs and Crime (UNODC) is implementing activities ranging from annual crops to

agro forestry totaling \$1.8 million. The project is financed by USAID and is scheduled to begin in December 2004, pending environmental assessment of activities.

The USAID Dairy Promotion program is promoting sustainable small farm dairy production, processing and marketing, while the CAPP program is supporting small farmer, private sector projects in cacao and African palm production.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in Nariño.

The CFPD will be supporting forest policy changes and carrying out activities for the improved production, processing and marketing of forest and wood products in Nariño, as well as in Antioquia, Chocó, and Magdalena.

The GOCs supporting activities in coffee renewal and oil palm production.

#### **Norte de Santander**

The CAPP program is supporting private sector initiatives with small farmers in the production and processing of African palm and Cacao.

The CAD project is promoting cacao and African palm production, processing, and marketing.

The USAID alternative development activities implemented through PAFD are working in association with ASOHESAN (the Santander rubber producer's association) to support the cultivation of 1,652 hectares of rubber that would benefit 411 families. The project includes as well the establishment of 826 hectares of short-term crops and 137 food security systems (vegetable gardens, small animal husbandry).

The GOCs supporting palm oil crop production in the department.

#### **Putumayo**

The CAD project is supporting activities in Putumayo for short and medium-term crop production with farmers and indigenous groups, hearts of palm production, processing and marketing; rubber production, processing and marketing; forest management and value added processing and utilization of forest and wood products; infrastructure projects, including bridge construction and road improvements, schools, and health facilities. As part of the development of production and marketing chains, support is being provided for the private sector involvement in processing plants and marketing for cassava chips, black pepper and plantain; tropical flowers and foliage, vanilla production, as well as for medicinal plants and essential oils.

U.S. Army Corps of Engineers' \$6.7 million rural infrastructure project, funded by USAID, is carrying out road, sewage and water treatment activities that are generating new employment in the region.

The Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team, is supporting indigenous communities with improved food security, health, local governance, and land management.

#### **Santander**

The GOCs supporting cocoa and oil palm production in this department.

The CAPP is supporting private sector initiatives with small farmers in the production of cacao and African palm.

#### **Tolima**

The CAD project is supporting an activity to increase annual crop production for food security and to increase income and employment generation in the longer term through forestry, livestock and cold climate fruit production.

The Specialty Coffee activity is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

The Colombia Enterprise Development (CED) project, funded by USAID and implemented by CARANA Corporation, is supporting small and medium enterprise development in Colombia's secondary cities including those in Tolima.

The Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in the department, while the ARD/CAPP is supporting private sector projects in fruits, natural rubber and cacao production.

The GOCs supporting cacao and coffee activities.

**Vaupes**

The Sustainable Development for Indigenous Colombian Communities project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

**Vichada**

The GOC is providing institutional strengthening to indigenous community associations.

The preceding six sections combined with the detailed attachments form the basis of the Justification for the Secretary of State's 2004 Certification of Conditions Related to the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia.

**Attachments**

1. [Secretary Powell's September 27, 2004 Letter to EPA Administrator Leavitt](#)
2. [2004 Department of State Report to EPA on Human Health and Environmental Monitoring Related to the Colombian Illicit Crop Eradication Program](#)
3. [Letter and Consultation Report from EPA Administrator Leavitt](#)
4. [Letter from Colombian Alternative Development Agency \(PDA\) Thanking the Embassy for its Rapid Attention to a Human Health Complaint](#)
5. [Government of Colombia \(GOC\) Ruling No. 707 that States that the Illicit Crop Eradication Program is being Conducted in Compliance with the GOC Environmental Management Plan \(EMP\)](#)
6. [EPA letter confirming that information in the EMP is generally in agreement with information provided to EPA for the previous consultations](#)

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## Secretary Powell's Letter to EPA Administrator Leavitt

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**September 27, 2004**

Dear Mr. Leavitt:

I am writing to seek your assistance in preparing a certification required by the Consolidated Appropriations Act, 2004 (H.R.2673). The certification must be submitted to Congress before the Department of State can obligate a portion of its FY 2004 funds for aerial eradication programs in Colombia.

Specifically, the Act states that the Secretary of State, in consultation with the Administrator of the Environmental Protection Agency (EPA), must certify to the Committees on Appropriations that: "(1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by the EPA for this program, and with the Colombian Environmental Management Plan for aerial fumigation; and (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment." I have enclosed the relevant excerpt from the Consolidated Appropriations Act, 2004.

The Department of State's Bureau of International Narcotics and Law Enforcement Affairs (INL) consults regularly with EPA's Office of Pesticide Programs to seek guidance on issues related to the chemicals applied in the U.S.-supported aerial eradication program in Colombia. INL has provided Office of Pesticide Programs personnel with comprehensive information about the methods used to apply these chemicals in Colombia to eradicate coca and opium poppy. I have enclosed further information on human health and environmental monitoring related to the U.S.-supported coca eradication program in Colombia to supplement information provided to EPA in 2002 and 2003 during similar consultations.

Accordingly, I ask that you provide the Department of State with a written response to confirm that the Department of State and the EPA have consulted concerning the U.S.-supported aerial coca eradication program in Colombia. I also ask that you confirm that the herbicide mixture employed by the U.S.-supported program of aerial eradication of coca and opium poppy in Colombia is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by the EPA for this program; as well as with the Colombian Environmental Management Plan for aerial fumigation. Finally, I ask that you confirm that this herbicide mixture, in the manner it is being used, does not pose unreasonable risks to or have adverse effects upon humans or the environment. I plan to submit your response as part of the certification that the Consolidated Appropriations Act, 2004 requires me to submit to Congress, and would appreciate your response on or before November 1, 2004.

INL Assistant Secretary Robert Charles and his staff stand ready to provide any further briefings you or other concerned EPA personnel may need. Thank you for your assistance with this vital program to reduce the supply of dangerous drugs into the United States.

Sincerely,

Colin L. Powell

Enclosures:

As stated.

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## Letter and Consultation Report from EPA Administrator Leavitt

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**November 17, 2004**

**United States Environmental Protection Agency Washington, D.C. 20460**

Nov. 17, 2004

The Honorable Colin L. Powell

Secretary

U.S. Department of State

Washington, D.C. 20520

Dear Secretary Powell:

I am pleased to inform you that the U.S. Environmental Protection Agency has completed its consultation review of the potential human health and environmental effects concerning the U.S.-supported aerial coca and poppy eradication program in Colombia.

In your letter of September 27, 2004, you asked the Agency to provide you with written confirmation that the Department of State and EPA have consulted in preparing a certification required by the Consolidated Appropriations Act, 2004. Specifically, you asked EPA to confirm: (1) that the Department of State and EPA have consulted concerning the U.S.-supported aerial coca eradication program in Columbia; (2) that the herbicide mixture employed by the U.S.-supported program of aerial eradication of coca and opium poppy in Colombia is being used in accordance with EPA label requirements for comparable use in the United States and any additional controls recommended by the EPA for this program, as well as with the Colombian Environmental Management Plan for aerial fumigation; and (3) that this herbicide mixture, in the manner it is being used, does not pose unreasonable risks to or have adverse effects upon humans or the environment.

EPA conducted its assessments based on information provided to us by the Department of State's Bureau of International Narcotics and Law Enforcement Affairs. As you know, INL has consulted with EPA's Office of Pesticide Programs, and as part of this effort, EPA has previously provided reviews of the Department of State's eradication spray program activities in 2002 and 2003. EPA has compared coca and poppy eradication practices with the closest approximate use in the United States, reviewed potential human health concerns, and evaluated toxicity testing conducted on the spray mixture that INL has indicated is being applied in Colombia. In this consultation review, we have also reviewed progress of the Colombian government's efforts to evaluate the effects of the spray program on human health and the environment in areas where it has been used to eradicate illicit crops.

I have attached the consultation review document that we trust will assist you in preparing the certification that must be submitted to Congress. Please let me know if you have additional questions concerning our consultation review.

Sincerely,

Michael O. Leavitt

Enclosure

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**U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF PESTICIDE PROGRAMS  
DETAILS OF THE 2004 CONSULTATION FOR THE DEPARTMENT OF STATE  
USE OF A HERBICIDE FOR COCA AND POPPY ERADICATION PROGRAM IN COLOMBIA  
OCTOBER 2004**

**EXECUTIVE SUMMARY**

**CONSULTATION REVIEW OF THE USE OF A HERBICIDE FOR COCA AND POPPY ERADICATION IN COLOMBIA, 2004**

The Department of State (DoS) assists the Government of Colombia with training, contractor support, financial assistance, and technical and scientific advice for aerial pesticide spraying activities designed to eradicate the illicit crops coca and poppy in Colombia. The U.S. Environmental Protection Agency (EPA) has completed an assessment at the request of DoS, on whether the herbicide mixture, in the manner it is being used in Colombia for coca and poppy eradication, does not pose unreasonable risks or adverse effects to human health or the environment. The Agency has reviewed information provided to us by the DoS to confirm that the herbicide mixture is being used according to EPA label requirements for comparable use in the United States, any additional controls recommended by EPA for this program, and with the Colombian Environmental Management Plan for aerial fumigation.

EPA concludes from its assessment of the submitted and available information on the spray program and the herbicide glyphosate that there does not appear to be any evidence that glyphosate aerial spraying of coca or poppy has resulted in any adverse human health effects among the population where this spraying occurs in Colombia. There have been no substantive changes to the eradication program's method of aerial glyphosate application or the spray formulation. Although the measured toxicity and estimated exposure indicate that only nontarget terrestrial plants are likely to be adversely affected by the use on coca and poppy, important uncertainties should be considered. The Agency findings from 2002 and 2003 remain relevant to the current coca and poppy eradication activities in Colombia. The DoS and the Government of Colombia made modifications and enhancements to the spray program as EPA recommended in its prior assessments. This is an interim finding that may change as new information becomes available and followup is performed. Details of EPA findings are provided in the attached document.

**I. BACKGROUND**

The Department of State (DoS) assists the Government of Colombia with training, contractor support, financial assistance, and technical and scientific advice for an aerial pesticide spraying program designed to eradicate the illicit crops coca and poppy. The eradication program includes the use of a spray mixture of a glyphosate formulation, an adjuvant (Cosmo-Flux 411F), and water. The glyphosate tank mixture is applied aerially as a foliar application in certain provinces of Colombia. As required by the Consolidated Appropriations Act, 2004 (H.R.2673), DoS has consulted with the U.S. Environmental Protection Agency (EPA) to ensure that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to human health or the environment. As part of this effort, EPA has previously reviewed DoS eradication spray program activities in 2002 and 2003. This review updates and comments on the progress of the Colombian government to evaluate the effects of the glyphosate spray program on human health and the environment in areas where it has been used to eradicate illicit crops, as requested by DoS, in a letter dated September 27, 2004.

**II. SUMMARY OF PREVIOUS ASSESSMENTS**

In 2002, EPA reviewed the coca eradication program in Colombia and concluded that there was no evidence of significant human health or environmental risks from the spraying. EPA did recommend that DoS switch to a herbicide product with lower toxicity due to a potential hazard to the eyes of pesticide mixers/loaders. EPA also asked DoS to conduct field investigations of health complaints associated with coca eradication. The Agency further concluded that spray drift was likely to cause phytotoxicity downwind of sprayed coca fields. The Agency reached its conclusions from a thorough review and assessment of the available scientific studies on glyphosate and glyphosate-containing formulated products and their use in the United States and in conjunction with information on the spray program in Colombia. The final conclusion was that EPA could not verify the product formulation because the product was manufactured outside the United States and not registered by the EPA.

In 2003, DoS adopted EPA's recommendation and began using a lower-toxicity glyphosate product in its coca and poppy eradication programs, and implemented a program to investigate health complaints. Based on a comparison of the glyphosate use pattern in Colombia and approved use patterns of glyphosate products in the United States, EPA determined that application rates for both coca and poppy eradication in Colombia were within the parameters listed on U.S. labels. The Agency could not verify the quality of the product since it is formulated outside of the United States, but a review of toxicity testing on the spray mixture solution did not

uncover any irregularities.

EPA concluded in 2003 that there were no risks of concern from dietary exposures or from exposures to mixer/loader/applicators or field workers, including bystanders. The concerns for mixer/loader eye irritation discussed in EPA's 2002 review were mitigated in 2003 by switching to a lower-toxicity glyphosate product registered by both EPA and the Government of Colombia.

The DoS and the Government of Colombia initiated two programs to investigate health complaints. Regarding potential environmental effects from the eradication programs, EPA concluded that the switch to a lower-toxicity product would present less risk of acute poisoning to wildlife, while potential phytotoxicity due to spray drift could still be a factor in both coca and poppy spraying. EPA recommended that DoS continue programs for investigating health complaints, and the Agency also asked DoS to develop a case definition for what would constitute a glyphosate-related adverse effects exposure, provide further documentation of its investigations and how they are conducted, and standardize data collection.

In February 2004, in response to a request from DoS, EPA reviewed the Environmental Management Plan for the Illicit Crop Eradication Program in Colombia (EMP). DoS asked EPA to assess whether use of the herbicide mixture in Colombia is in accordance with the EMP. The Plan described general descriptions of many activities related to the spray program including references to Colombian laws that were to be followed. EPA concluded that the Plan contained appropriate types of activities for a pesticide spray program. These activities include spray application requirements and restrictions, training and safety precautions for personnel who handle and apply the pesticide, handling of waste resulting from program operations, training public health workers to recognize and treat pesticide poisoning, handling of health and environmental complaints, environmental monitoring, and contingency plans for emergencies. EPA recognized that these types of activities were appropriate for pesticide spray programs and generally reflect similar activities that can be included on pesticide spray programs in the United States, depending on the specific pesticide, use conditions, known potential risks, and federal, state, or local laws.

EPA offered comments on two specific sections of the EMP. First, the Agency urged DoS to investigate methods for properly disposing of pesticide containers rather than reusing them. The second comment was regarding the statement in the EMP that there were no significant impacts to plants that surrounded the illicit crops being sprayed. EPA reiterated its position previously stated in the consultations - that glyphosate is highly toxic to many plants and that some level of adverse effects is likely to occur to some nontarget plants as a result of spray drift, as can be expected with herbicide applications. The Agency suggested an appropriate revision of the wording in the EMP.

### III. ASSESSMENT OF THE AERIAL SPRAY PROGRAM IN 2004

In a letter dated September 27, 2004, to Michael O. Leavitt, Administrator of EPA, the Secretary of State formally asked EPA for a written response to confirm that the DoS and EPA have consulted concerning the U.S.-supported coca and poppy eradication program in Colombia. The Secretary asked EPA help certify that the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States, any additional controls recommended by EPA for this program, and the Colombian Environmental Management Plan for aerial fumigation. The Secretary also asked EPA to confirm that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

EPA has reviewed the following reports, enclosed with the above letter, pertaining to human health and the environment:

1. Evaluation of the Effects of Glyphosate on Human Health in Illicit Crop Eradication Program Influence Zones. Bogota, July 2003, National Health Institute.
2. Progress Report on the Illicit Crop Eradication Program Through Glyphosate Spraying (PECIG) Environmental Management Plan by the National Institute of Health.
3. Survey to Evaluate the Effects of Glyphosate and Other Pesticides on Human Health in PECIG Influence Zones.
4. A presentation entitled "Evaluation of the Effects of Glyphosate on Human Health in Areas of Influence of the Illicit Crop Eradication Program (PECIG)" prepared by the Ministry of Social Protection and the National Institute of Health.
5. Toxicologist's report on the investigation of the case of the death of a person exposed to spraying using a glyphosate mixture, "Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia" by J. H. B. Tobon, M.D., July 4, 2003.
6. Minister of the Environment, Housing and Regional Development Ruling No. 707, containing an evaluation of compliance with the measures established in each of the specifications which make up the Environmental

Management Plan, Bogota, July 26, 2004.

7. Interagency Soil and Water Sampling Field Study Report: Glyphosate Persistence in and Effects on the Soil and Bodies of Water.
8. Soil and Water Sampling Protocols and Excel Spreadsheets of the Soil and Water Residue Sampling Results.
9. July 23, 2004, Technical Opinion from the Republic of Colombia Ministry of the Environment, Housing and Regional Development evaluating the program's compliance with management measures established in the Environmental Management Plan.
10. Glyphosate (10.4 L/HA) and Three Adjuvants, for the Control of Illicit Coca Crops, *Erythroxium* spp.: Agronomic Efficacy Testing of Doses of Glyphosate in Illicit Crops, Bogota, July 2004.

#### **A. REVIEW OF HUMAN HEALTH RISK**

Evaluation of the Effects of Glyphosate on Human Health in Illicit Crop Eradication Program Influence Zones. Bogota, July 2003, National Health Institute.

This document provides the protocol for conducting a descriptive case study to determine if there are any human health risks associated with spraying glyphosate. The authors note that according to reports, glyphosate, along with paraquat and 2,4-D, are widely used herbicides on land where coca crops are grown. An estimated 61 percent of the use on the land is due to paraquat and about 19 percent of the use is due to glyphosate application by coca growers. Fungicides and insecticides also figure prominently in the cultivation of coca. Given this widespread use of pesticides and exposures to other chemicals, there may be some health effects that could be difficult to differentiate as to cause. The lack of technical knowledge by growers and surrounding farmers is an important barrier to distinguishing the effects of aerial spraying from those of other pesticides.

The study protocol identifies the specific areas to be studied based on the prevalence of spraying for eradication in those areas. Case definitions for suspected and probable cases are defined for individuals who seek health care based on symptoms and signs of poisoning. A questionnaire was developed that evaluates signs and symptoms, medical history, the person's exposure to pesticides and use of protective equipment, and types of pesticides used. Biological monitoring was developed to assess exposure to glyphosate, organochlorines, and cholinesterase-inhibiting insecticides. Procedures for collecting biological samples are clearly described. An integral part of the study was a training course on diagnosis of pesticide intoxication for health professionals residing in the area under study.

The protocol requires that "all subjects with a history of exposure to pesticides who have signs and symptoms compatible with acute intoxication will be reported to the National Public Health Control System (SIVIGILA) using the individual notification form." Duties for different individuals participating in collecting and monitoring the study progress are specified. An Epi-Info program will be used to capture the information collected and to perform analysis. Inclusion and exclusion criteria are specified to determine which individuals will be included in the final analysis.

Progress Report on the Illicit Crop Eradication Program Through Glyphosate Spraying (PECIG) Environmental Management Plan by the National Institute of Health.

The National Health Institute of Colombia acknowledged that there had been under-reporting and low coverage of pesticide poisonings in the past. Four territories where spraying is most active were targeted for training of health teams. A total of 284 environmental health professionals, technicians, and rural health providers received training in recognition and reporting of pesticide poisoning between September 2003 and January 2004. An active search for cases identified 39 possible cases of glyphosate intoxication from May to July 2004. Another four possible cases were reported to the health units. Samples have been taken to determine the presence of glyphosate, its metabolite, and other pesticides in urine. Telephone followup has been performed, and field investigations are being considered to identify additional cases that may be occurring after spraying. An additional seven training sessions are planned in the targeted areas.

Limitations in reporting and following up cases involving glyphosate are recognized and acknowledged in the report by the National Institute of Health. These include:

- repeated changes in weather conditions and spray schedules, which make planning and followup difficult;
- trained health personnel are often transferred or leave the agency;
- the community is reluctant to participate in the study and some have expressed concern that legal crops have been affected by the glyphosate spraying activities;
- the population is dispersed and difficult to access by telephone or other means; and

- extreme weather conditions limit the research teams' mobility.

Survey to Evaluate the Effects of Glyphosate and Other Pesticides on Human Health in Pecig Influence Zones.

The survey form used to capture information in a standardized format includes sections for general data, patient's data, medical exam data, characterization of exposure, occupational history, social background, attitude towards the ICEPG, medical chart, and laboratory results. The questionnaire is fully responsive to the earlier recommendations by EPA to "standardized collection of data on patients and their symptoms."

A presentation entitled "Evaluation of the Effects of Glyphosate on Human Health in Areas of Influence of the Illicit Crop Eradication Program (PECIG)"

This presentation provides specific objectives for monitoring potential adverse effects of aerial glyphosate application. Cases may be reported by persons consulting the Institute of Health directly, by an active search for cases by the environmental health professionals and rural health providers, and by reporting from community leaders and municipal ombudsmen. The presentation provides specific case definitions for a suspect, probable, and confirmed case. It also advises on key procedures to follow to obtain biological specimens for determination of glyphosate and its metabolite in urine. This presentation is appropriately targeted to identifying health effects due to pesticides.

Toxicologist's report on the investigation of the case of the death of a person exposed to spraying using a glyphosate mixture. "Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia" by J. H. B. Tobon. M.D.. July 4, 2003

This report describes the followup on a reported fatality associated with exposure to glyphosate application for coca eradication. Information collected from the initial clinical files reported intense headaches, vomiting, fever, and progressive deterioration of consciousness. The victim's spouse reported that the symptoms described started ten days after the coca field where he had been working was sprayed. When hospitalized this patient exhibited additional signs and symptoms of hypersecretion of saliva, contracted pupils, paleness, difficulty breathing, excessive pulmonary secretions, profound depression of consciousness, and no response to stimuli. Despite treatment, which included atropine for suspected organophosphate insecticide poisoning, the patient died two hours later. Another physician reported that the patient had renal failure and his symptoms were consistent with central nervous system infection or intoxication due to organophosphate or carbamate insecticide. Dr. Tobon concluded that the signs "greatly suggest intoxication of a cholinesterase-inhibitor chemical substance" and that "we are certain that the death cannot be attributed to exposure to glyphosate." The Agency agrees with these findings based on the known toxicity of glyphosate as compared to other pesticides.

Ministry of the Environment, Housing and Regional Development report on Ruling number 707 which includes a public health program (specification number 7)

Consistent with the reports above, the public health program was designed "to develop risk management measures for preventing, mitigating, correcting and offsetting effects on health which could be associated with aerial spraying of glyphosate in areas where PECIG operates." The report notes an initial budget for this activity of around 200 million pesos (about \$80,000 in U.S. dollars). As reported above, 284 members of health teams in the four targeted provinces "have received training in diagnosing, managing, preventing and supervising poisoning caused by herbicides and in the research project execution methodology." The report submitted by the National Health Institute found only three suspicious cases that have been reported since September 2003. An international agreement is being put in place to permit analysis of samples, so that it can be established whether glyphosate or other pesticides are present at levels that might be harmful to public health.

**Comments on the Reports on Human Health**

The reports submitted by DoS make clear that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent. A significant number of health care providers have received training and additional training is under way or planned. EPA had earlier recommended case definitions and standardized collection of data. The submitted test protocol meets those objectives. Trainees received specific information on being alert for digestive, dermal, ocular, and respiratory symptoms. This is a comprehensive and appropriate approach for detecting ill effects of glyphosate. The use of biological monitoring to further confirm exposure will help eliminate numerous cases of illness that are likely to occur coincidentally to aerial spraying, but are not, in fact, caused by the exposure to glyphosate. Although there have been reports (about 43 in 2004), the majority were classified as possible or suspicious. There were no cases classified as probable or confirmed, though a confirmed case would require verification from

laboratory samples which, apparently, have not yet been processed or may not be available yet.

Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place. This is an interim finding that may change as new information becomes available and follow-up is performed. Since efforts to obtain and gather such information are under way, one should be cautious and not over-interpret these preliminary findings.

EPA also offers the following suggestions for the data collection form:

- **General Data:** Record date and contact information about the health care provider (who fills out the form) in case followup consultation is needed.
- **Characterization of the Exposure:** Record more information about the location of exposure and any description about the proximity to the spraying (how far away) or amount of exposure (e.g., amount of skin exposed, eyes exposed, etc.).

EPA found the distinction between the suspect and probable case definitions somewhat difficult to follow. The Agency suggests measuring the length of time between last exposure and effects and giving greater weight to those effects that appear within 24 hours, when glyphosate effects would normally be expected.

The Agency provides these suggestions to assist the Colombian National Institute of Health in the efficient analysis of information that comes as a result of its investigations. The Colombian Ministry of Social Protection and the National Institute of Health are to be commended for their responsive and aggressive approach to assessing the public health concerns associated with the use of pesticides. The Colombian agencies' scientific protocol for identifying potential effects of glyphosate shows great care. Their approach is scientifically sound and responsive to previous comments provided by EPA.

## **B. REVIEW OF ECOLOGICAL RISK**

In 2002, EPA prepared an ecological risk assessment of the coca eradication program in Colombia. EPA determined that spray drift was likely to cause phytotoxicity downwind of coca fields. The Agency was asked to consider the opium poppy eradication program in 2003. As with coca eradication, the use of glyphosate for opium poppy eradication is done aerially. Based on information provided by the DoS regarding poppy eradication, the total area sprayed is less than for coca eradication, individual poppy sites are smaller and located at higher elevations, and the rate of glyphosate application for poppy eradication is lower than that for coca. Application rates for both coca and poppy eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States. Based on the results of the opium poppy eradication assessment, EPA concluded that the potential for spray drift phytotoxicity continues to be a factor for coca spraying. Spray drift and potential effects down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses. In the United States, EPA considered estimates of spray drift in its risk assessments of pesticide uses and registration decisions.

In addition to the documents submitted with the September 27, 2004, request, the DoS also indicated that there have been no substantive changes to the eradication program's method of aerial glyphosate application or the spray formulation. Based on a review of the submitted documents and current information indicating no changes to the program's application methods, the Agency findings from 2002 and 2003 remain relevant to the current coca and poppy eradication activities in Colombia. A review of the submitted information as it pertains to the results of previous ecological assessments is provided below.

### **Soil and Water Residue Analysis**

Interagency Soil and Water Sampling Field Study Report: Glyphosate Persistence in and Effects on the Soil and Bodies of Water

Soil and Water Sampling Protocols and Excel Spreadsheets of the Soil and Water Residue Sampling Results

During November and December of 2003, a Government of Colombia interagency team collected and analyzed soil and water samples to determine the persistence of glyphosate and its principal metabolite - amino-methyl phosphonic acid (AMPA) - in Colombian soils and water following aerial application to illicit coca crops. A review of the methods used to analyze the soil and water samples indicates that they are typical analytical chemistry methods and recognized by EPA as acceptable to characterize glyphosate and AMPA in soil and water.

The results of the soil sampling showed no statistically significant differences between residual levels of glyphosate and AMPA in the pre- and post-spraying soils. It appears that similar levels of glyphosate and AMPA in pre- and post-spray soils may be the result of interception of the herbicide by the foliage. The toxic effect of glyphosate to post-emergent plants is a result of aerial application of glyphosate onto the foliage of

nontarget species (i.e., plants other than coca, and poppy). Therefore, the soil data cannot be used to refine environmental exposure concentrations for plants. Glyphosate levels on the foliage are expected to be much higher than those in soil, and toxic effects are due to application of the herbicide directly to the postemergent foliage rather than to soil uptake. The fraction of glyphosate that reaches the soil is a result of precipitation that washes the herbicide from the plant leaves and stems into the soil, and/or attempts by growers to wash the plants after spraying to salvage their crops. In addition, it appears that detected concentrations of AMPA in the pre-spraying soil may be due to glyphosate usage by growers to control weeds and undesirable plants that compete with the coca crop.

Pre-spraying concentrations of glyphosate and AMPA in bodies of water contiguous to or near coca crop plants were negligible (i.e., less than detection limits) from the four sample sites. Maximum concentrations of glyphosate and AMPA in water following spraying activities were 397 ppb and 0.18 ppb, respectively. Comparison of the glyphosate monitoring data with modeled concentrations used in the EPA's ecological assessments for glyphosate applications in the U.S. shows that the modeled surface water concentration of 230 ppb is lower than the maximum detected concentration of 397 ppb. The Agency's modeled concentration is based on direct application of 3.75 lb acid eq./acre of glyphosate to a 1-acre, 6-foot deep pond, EPA's standard for modeling pesticide residues in water bodies. Although glyphosate was detected in water adjacent to coca crops at a higher concentration than predicted by the Agency's previous assessments, the maximum detected concentration of 397 ppb is well below acute and chronic effects levels (ppm) for fish, aquatic invertebrates, and aquatic plants, species used for estimating risks to species in the U.S. Therefore, similar to the results of previous Agency assessments, no risks are predicted for aquatic animals and plants, based on exposure to residual glyphosate or AMPA in water bodies contiguous to or near coca crops.

Maximum concentrations of glyphosate measured in surface water as part of the monitoring program were 397 ppb. According to data presented in the *Interagency Soil and Water Sampling Field Study Report* (Section 3.2), pre- and post-spray glyphosate surface water samples were collected from only four sites. At two of the four sites, post-spray glyphosate was not detected (detection limits were not provided). At the other two sites, post-spray glyphosate was detected at concentrations of 0.998 and 397 ppb. Therefore the results of the water sampling are highly variable and the limited number of samples allows for only-qualitative comparison and not a quantitative statistical analysis of the water monitoring data.

Using runoff simulations from Agency exposure models PRZM and EXAMS, the concentration that may result from direct application of 3.75 lb acid eq/acre of glyphosate to a 1-acre, 6-foot deep pond is 230 ppb, as noted above. The coca use application rate is 4.4 lb a.i./acre or 3.3 lb acid eq/acre; therefore, use of 3.75 lb acid eq/acre in modeling is a conservative estimate of exposure. It is possible that greater levels of exposure could occur from direct overspray of water bodies much smaller than a 1-acre, 6-foot deep pond, but such simulation is not a standard component of Agency risk assessments. The product label for glyphosate prohibits such direct overspray of water bodies, but it is possible that some water bodies too small or ephemeral to appear on maps could be sprayed directly in a project as large as the coca eradication program. U.S. EPA approved uses of certain glyphosate products do permit application to aquatic areas for vegetation control; for these uses EPA would expect glyphosate and AMPA residues in water.

#### **Colombia Ministry Technical Opinion and Efficacy Testing**

July 23, 2004, Technical Opinion from the Republic of Colombia Ministry of the Environment, Housing and Regional Development evaluating the program's compliance with management measures established in the Environmental Management Plan

Glyphosate (10.4 L/HA) and Three Adjuvants, for the Control of Illicit Coca Crops, *Erythroxium* spp.: Agronomic Efficacy Testing of Doses of Glyohosate in Illicit Crops, July 2004

A Technical Opinion was issued by Colombia's Ministry of the Environment, Housing and Regional Development on July 23, 2004. The purpose of the Technical Opinion was to evaluate the program's compliance with management measures established in the Environmental Management Plan (EMP). The EMP was created by the Ministry to prevent, mitigate, control, offset, and correct any possible negative environmental effects or impacts which might result from eradicating illicit crops. Based on the evaluation, the Ministry concluded that the entities responsible for executing the crop eradication program are currently complying with the measures established in the EMP. A summary of the compliance evaluations for the spray operation management program and environmental monitoring program is discussed below.

The Ministry's evaluation of the spray operation management program shows that technical parameters established in the EMP relating to flight altitude, maximum spray mix discharge, application rate, spray drift control measures, droplet size, temperature, and wind speed are being followed. Operations records indicate that

spray missions are cancelled for unfavorable weather conditions that could affect application efficiency and/or adherence to meeting safety and environmental standards. A review of the spray systems fitted to aircraft shows that they operate normally, and routine maintenance and calibration of all spray systems are conducted.

Spraying efficacy verifications and collateral effect evaluations were completed in 2004. Coca plant death effectiveness figures of more than 85 percent were observed from spraying activities in different areas. Phytotoxicity to border plants from spray drift of the glyphosate spray mixture were observed on a random basis, and were described as temporary in nature and small in extent. This is expected and is from the mode of toxicity and degradation of glyphosate commonly demonstrated in the United States from glyphosate applications. Drift effects included partial defoliation of the canopy of high trees. No other collateral damage from spraying activities was observed at the selected sites. In spray areas that were subsequently abandoned, it was noted that vegetation, including grasses and herbaceous species, was beginning to grow again. In the case of plots that had been completely abandoned (i.e., with no evidence of human activity), advanced vegetative succession, including the presence of balsa wood and secondary forest, was observed.

The results of the glyphosate soil and water samples were discussed as part of the environmental management program evaluation. In addition, the evaluation included a discussion of a current study on the dynamics of vegetative succession based on existing satellite images of sprayed areas. Satellite images showed a spectral response of stubble grass and low stubble three months after spraying; at less than three years following spraying, secondary forest appeared, indicating significant signs of recovery in the vegetative structure.

Although the measured toxicity and estimated exposure indicate that only nontarget terrestrial plants are likely to be adversely affected by the use on coca and poppy, important uncertainties should be considered. One of these is the extrapolation of North American data to the conditions and wildlife found in Colombia. The toxicity of a pesticide to different classes of animals and plants can vary widely among species in an individual ecosystem. The Agency uses for its hazard and risk assessments of pesticides used in the United States, test North American species as surrogates for other North American species not tested, but has limited experience with tropical flora and fauna. Similarly, laboratory and field estimates of the environmental fate of pesticides, including potential surface-water contamination, are performed with North American soils, hydrology, and climate data. Identifying characteristics that define sensitive tropical ecosystems would most effectively reduce the uncertainty of extrapolating North American exposure and effects data.

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## EPA Letter to INL Regarding the Spray Program's Compliance with the Government of Colombia's Environmental Management Plan for Illicit Crop Eradication

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**Washington, DC**

**February 23, 2004**

**United States Environmental Protection Agency**

**Washington, DC**

**20460**

**Office of Prevention, Pesticides and Toxic Substances**

February 23, 2004

Mr. Thomas H. Martin, Director

INL Latin American Programs

Department of State

2201 C Street, NW

Room 7811

Washington, DC 20520

Dear Mr. Martin:

This is a response to the Department of State's (DoS) request that the Environmental Protection Agency (EPA) review the Environmental Management Plan for the Illicit Crop Eradication Program in Colombia (EMP). Specifically, DoS asked EPA to assess whether use of the herbicide mixture in Colombia is in accordance with the EMP, as included in the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002, (P.L. 108-7). As you know, in 2002, EPA was asked to consult regarding potential health and environmental effects from use of the glyphosate pesticide spray mixture for coca eradication. In 2003, our consultation considered both coca and poppy eradication efforts.

The Agency reviewed the EMP for comparison with applicable U.S. requirements for pesticide use and we believe the Plan contains appropriate types of activities for a pesticide spray program. The information in the EMP is generally in agreement with information provided to EPA for the previous consultations and discussed in EPA's 2002 and 2003 written assessments. The EMP provides additional information regarding the spray program, such as requirements for environmental monitoring, waste management, and contingency plans.

The EMP gives general descriptions of many activities related to this spray program, including references to relevant Colombian laws, which are to be followed. These activities include spray application requirements and restrictions, training and safety precautions for personnel who handle and apply the pesticide, handling of waste resulting from program operations, training public health workers to recognize and treat pesticide poisoning, handling health and environmental complaints, environmental monitoring, and contingency plans for emergencies. EPA recognizes that these types of activities are appropriate for pesticide spray programs and in general reflect similar activities which can be included for pesticide spray programs in the U.S., depending on the specific pesticide, use conditions, known potential risks, and Federal, state, or local laws. In general Federal requirements and restrictions for handling and using pesticides in the U.S. are specific to individual licensed pesticides for their permitted uses; requirements are stipulated on the labels of individual products.

There were two specific sections of the EMP that EPA would like to offer comments. First, according to the



Domestic Solid Waste Management Program, empty pesticide containers may be used for collection of garbage or for building barriers after containers are "completely washed and perforated." However, pesticide product requirements in the U.S. prohibits reuse of containers and suggests disposal by appropriate means, unless the containers are collected by the manufacturer for refilling. We would urge DoS to investigate with the manufacturer or the Government of Colombia methods for properly disposing of these containers rather than reusing them. The second specific comment relates to the Environmental Monitoring Program which states there is no significant impact on plants that surround the illicit crops being sprayed. As our consultation documents of the past two years have stated, glyphosate is highly toxic to many plants. Some levels of adverse effects are likely to occur to some non-target plants as a result of spray drift, as can be expected with herbicide applications. The Agency suggests an appropriate revision of this wording.

I hope this information is helpful. If you have additional questions, please let me know.

Sincerely,

Jay S. Ellenberger

Associate Director  
Field and External Affairs Division  
Office of Pesticide Programs

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## Protocol for Water Sampling for Glyphosate and AMPA Residue Analysis

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**Washington, DC**

**April 12, 2005**

**The Government of Colombia ♦s Institute of Agriculture and Husbandry (ICA)**

**Bogot ♦, 2003**

### **Annex 1: Sampling Bodies of Water for Glyphosate and AMPA Residues Analysis (ICA)**

#### **1. OBJECTIVE**

To do reliable, representative sampling in surface bodies of water to enable a quantitative determination of the presence of glyphosate and AMPA residues.

#### **2. GENERAL CONSIDERATIONS**

1. *Sample* means the complete, homogenized accumulation of the various secondary samples taken from a body of water, to analyze its properties and list them on the label.
2. *Secondary Sample* means the volume collected in the container for secondary samples in the body of water under study.

##### **2.1 Sampling Method**

According to Su ♦rez (1), the most appropriate sampling method is *restricted sampling* because it is limited to the population; therefore, the sample constitutes a portion of the population. It is not possible to take an element (sample) among many existing ones.

Said sampling procedure may be considered *stratified or territorial* (1) based on the conditions at the sampling points, so the samples are compound.

To illustrate: From a river, three different samples may be taken: one at the source, another in its stream, and the third at the outlet. In other words: at a point before the crop under study, near the crop, and past the crop.

The sample taker must consider the points that he/she deems critical for the emission of the compound under study as strategic sampling points (2). Such points are sampling sectors or strata.

A sample composed of secondary samples will be taken in each sector or stratum. We suggest collecting secondary samples in points of turbulence (3).

The secondary samples will be mixed to obtain the sample.

#### **3. GENERAL RECOMMENDATIONS**

1. Rinse the secondary sample and sample containers several times (3 or 4) using the water to be sampled (3,5).
2. For the sampling operation, be especially careful to not collect sediments (clay, mud, dirt, sand, etc.) along with the water; to avoid doing so, do not submerge the container to the bottom of the body of water; we suggest submerging it to an average depth.
3. After you collect the samples, store them until delivery in refrigerated devices or, if not, in a cool spot out of the sun (5).

4. To the extent possible, when collecting secondary samples, the container must be vertically submerged for the water to flow freely inside. See Figure 1. It is essential to use gloves.
5. Use diluted sulfuric acid to obtain a pH range from 3 to 4 for your sample.

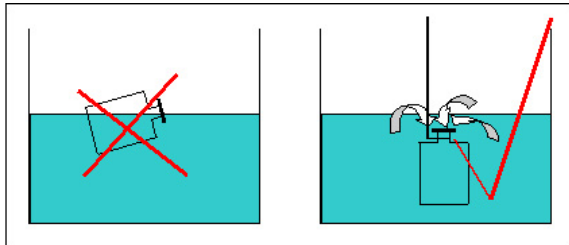


Figure 1

### 3.1 Materials Required for Sampling

1. A 1-liter amber-tinted glass bottle with a cap (sample container)
2. 250-ml. wide-mouth secondary sample containers
3. A Styrofoam cooler with a lid, to transport the samples to the lab where they will be analyzed
4. A pair of gloves
5. Labels to mark the water samples with the following information:
  - **Location** refers to data regarding the region and zone where the body of water sampled is located.
  - **Collection Site** refers to the location of the body of water per se, that is to say, at the source or at the outlet of a river, on a farm, near a specific crop, etc ♦ .
  - **Collection Date and Time** refers to the date and time when the secondary samples were collected from the water body, to be later transferred to the sample container.
  - **Number of Secondary Samples** refers to the number of secondary samples collected from the body of water, which were later transferred to the sample container (1-liter amber-tinted bottle).
  - **Sample Taker ♦s Name** refers to the name(s) of the person(s) who took the secondary samples and transferred them to the sample container (1-liter amber-tinted bottles), including, if possible, his/her (their) position(s) within the company in charge of collecting the sample.
  - **Appearance** refers to the visual inspection of the sample, determining sample characteristics such as aspect, odor, turbidity, presence of foreign elements, grease or oil, gaseous emissions, color, etc....

An example of a label appears below.

| <b>WATER SAMPLE</b>                       |                       |
|---|-----------------------|
| <b>Glyphosate and AMPA Analysis</b>       |                       |
| <b>Location</b>                           |                       |
| <b>Collection Site</b>                    |                       |
| <b>Date Collected DAY MONTH YEAR</b>      | <b>Time Collected</b> |
| <b>Number of Secondary Samples Taken</b>  |                       |
| <b>Sample Taker ♦s (Takers ♦) Name(s)</b> |                       |
| <b>Appearance</b>                         |                       |
| <b>Comments</b>                           |                       |

- **Comments** Here the sample taker adds any other information that he/she deems important regarding the sample or the collection site and/or relevant for sample analysis.
6. Sulfuric acid and Pasteur pipette

## 7. pH measuring papers

**3.2 Sampling Procedure**

1. Visually determine the points where the secondary samples will be collected, taking them from mid-point in the water and near the shore, in points of turbulence.
2. Wash secondary sample containers and sample containers with water from the sampling site (3 or 4 times) (3,5).
3. Submerge each secondary sample container vertically so that water enters freely, until the complete volume of the bottle volume is filled. See Figure 2.
4. Pour the full content of each secondary sample collected into the sample container (1 liter amber bottle).
5. Collect the next secondary sample, repeating steps 3 and 4.
6. Measure the pH, following the procedure established for that purpose.
7. Put the cap on the container, ensuring that there is no leakage.
8. Write the information required on the label and stick it on the sample container, using sufficient tape.
9. Store the container in a refrigerated device or at least in a cool spot out of the sun, until it is delivered to the lab.
10. Send the samples out in the duly sealed Styrofoam refrigerator as soon as possible.

**a. Procedure for measuring pH**

1. Make sure that your hands or the tool that you use to hold the pH measuring tape are completely clean.
2. Verify that the tape is not wet.
3. After firmly capping the sample container, shake it.
4. Uncap the container.
5. Submerge the tape, **but not completely**, into the water in the container.
6. Remove the tape from the container.
7. Find the color of the tape on the pH table supplied.
8. Repeat steps 5, 6 and 7.
9. The pH value must be the same the two times that you measure. If not, repeat the complete procedure.
10. Write on the label the pH value to which the color corresponds.
11. Acidulate the sample at a pH range from 3 to 4 using diluted sulfuric acid.
12. Write this pH value on the label.

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## Protocol for Soil Sampling for Glyphosate and AMPA Residue Analysis

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**April 12, 2005**

**The Government of Colombia ♦s Ministry of the Environment ♦s Institute of Hydrology, Meteorology and Environmental Studies (IDEAM)**

**Bogot ♦, 2003**

### Soil Sampling for Glyphosate and AMPA Residue Analysis

#### INTRODUCTION

The Colombian Technical Standards Institute (ICONTEC), in 1994 NTC 3656 standard, sets forth the methodologies for taking soil samples for the purpose of determining contamination and ensuring that lab analysis can evaluate their quality and contamination level. The guidelines in this standard were taken into account in the soil sampling proposal.

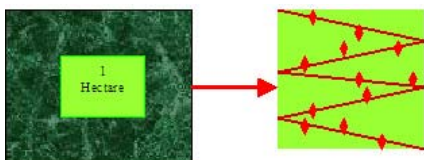
#### SAMPLING

The sampling unit will be one hectare in which 12 samples will be collected, 6 of which will be collected in one sector of the lot and later compounded or joined to produce one sample; the other 6 samples will be collected in the remaining sector of the hectare, to produce the second sample. These two compound samples will be used to make physical-chemical, glyphosate and AMPA analyses.

The locations will be randomly selected in areas affected by the presence of illicit crops (the sampling obtained prior to glyphosate spraying may be used as a reference pattern).

#### Sampling Methodology

Soil. In the selected areas, take samples in the central zones where a greater concentration of the applied formula is believed to be found, using 12 sampling points selected at random (Figure 3). Collect minimum 1,000 g. from each site, at a depth of 20 cm. It is important to write down the soil temperature and moisture *in situ* on each lot.



*Figure 3. Sample-taking Schema for Each Point Selected in Areas Sprayed with Glyphosate-based Formulas*

Collect the soil samples in Kraft paper bags, then put them into large Ziploc plastic bags and properly label (using a waterproof indelible marker). In addition, in each bag place a small identification format of the sample, protected by a smaller bag, of those used in IDEAM Geomorphology and Soils Subdivision, and also separately attach the field form (Annex 1).

For the physical-chemical and residue analysis of pesticides, create two samples from the initial 12, joining the 6 taken from one sector to make up one sample and the remaining six from the other sector to make up the second sample, as indicated in Figure 4.

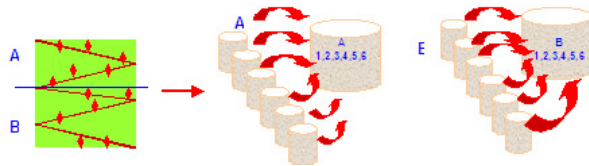


Figure 4. Schema Indicating How to Make Up the Compound Mixes for physical-chemical and residue analyses of pesticides.

### Sampling Format

Geo-reference the collected samples and fill out the form supplied by IDEAM for soils. In the post-spraying sample formats, remember to add additional information regarding the date, time, and operational and environmental conditions of the aerial spraying (i.e. wind speed, application height, etc.); this data will be supplied by the Anti-Narcotics Police and IDEAM.

### Glyphosate and AMPA Residues

Soils. Send the soil samples, following the technical guidelines provided by the Canadian CTQ laboratory. Send duly labeled 500 g. of soil with the corresponding identification form.

Soils. Collect the samples in quantities of 500 g. and put them in Kraft paper bags that will be later packed in plastic bags and duly labeled, following the recommendations.

### CUSTODY CHAIN PROTOCOL

One person will have the authority of being responsible for receiving and packing the samples, sealing and opening the coolers after each sampling. This person will verify the presence and condition of all of the samples, based on the forms on each cooler; this person will also verify the individual sample form. The team members must constantly supervise and watch over the samples and coolers during sample taking, storage and transportation.

### Sample-taking

**Soil.** Collect the soil samples following the provisions in number 4.2.1, checking that the identification sheet code matches the code on the bag. Also, the person in charge of custody must record on the forms if sampling conditions were met as well as the sample condition. Once at the air base, in the presence of the individual in charge of the custody chain and of witnessing (procedure that will be recorded on the forms), this person will proceed to create the two samples out of the 12 secondary samples for analyzing pesticide (glyphosate) residues and for physical-chemical analysis, taking from each bag approximately 100 grams; these new two compound samples must be duly labeled, writing the codes of the mixed samples on the identification sheet.

Glyphosate and AMPA samples must be coded and stored following the Canada Laboratory guidelines and the person in charge of custody will compound these samples to form two samples. The sample will be delivered to Bogot and handed over to the person who will act as Bogota-Canada custodian.

**Transportation.** The samples must be transported from the sampling site to the air base. There the custodian receives the samples and verifies the identification forms and the sample condition and then proceeds to separate the samples for physical-chemical and residue analysis, clearly identifying the procedure followed on the form. Once this process is done, the samples are stored in Styrofoam coolers with dry ice, or following the procedure set forth by the Canadian lab. Then they are sealed in the presence of witnesses and immediately taken to Bogota. In the lab, the person in charge of the Bogota-Canada custody and the authorized personnel at the different labs open the samples, verify the forms, deliver the samples according to the analytes, sign the delivery act writing down the condition, and seal the cooler again for its transfer to Canada.

## ANNEX 1

### SOIL SAMPLE AND FIELD IDENTIFICATION FORMS

HYDROLOGY, METEOROLOGY, AND ENVIRONMENTAL STUDIES INSTITUTE

Diagonal 97 No 17 - 60 Bogota, D.C., Colombia.  
PBX 6356230 Web <http://www.ideam.gov.co/>

Geomorphology and Soils Subdivision

|   |
|---|
| <p>Tel. 6356049, Fax 6356130, Piso 3<br/>Bogota, D. C.</p> <p>Chemical Physiology Program<br/>Oficinas Parque industrial de occidente (HB)<br/>Cra. 129 # 29 - 57 Bodega 17 - 18</p> <p><b>Tel: 4181181 - 4181215</b></p> |
|---|

| SAMPLE IDENTIFICATION |            |                 |           |      |
|-----------------------|------------|-----------------|-----------|------|
| Profile #             | DATE       | Day             | Month     | Year |
|                       |            |                 |           |      |
| Provincial Department | Settlement |                 | County    |      |
|                       |            |                 |           |      |
| Coordinates           | LW: ◊ ' "  |                 | LN: ◊ ' " |      |
| Altitude              |            |                 |           |      |
| Horizon               |            | Depth           |           |      |
| Limits                |            | From cm. to cm. |           |      |
| Analysis Requested    |            |                 |           |      |
| Sample                |            | Counter-sample  |           |      |
| Exploratory           |            | Monitoring      |           |      |

**NOTE [NOT INCLUDED IN THE ORIGINAL TEXT]**

This protocol has been modified in some technical aspects to adjust it to the difficult logistics and field conditions encountered. These modifications have been granted approval by the Ministry of Agriculture and Rural Development Colombian Framing and Livestock Institute (ICA), by Ministry of the Environment, Housing and Territorial Development technicians who have been present when all of the samples were taken, as well as by professional opinions from personnel at the Agustín Codazzi geographical Institute National Soils Laboratory.

These modifications are summarized below.

- The samples are not packed in "Kraft" paper bags because the moisture in the soil dissolves this type of paper, adding Boron (Br) and organic matter to the soil, altering the samples.
- Samples are collected in two recyclable plastic bags (LDPE) with airtight sealing (Ziploc type). The double bagging prevents losing the sample if the outside bag is punctured or if there is cross contact between samples.
- There are fewer secondary samples per area unit because there is little time from when the helicopter descends to when it must take off again, due to the hostile presence of outlawed groups. However, the samples are made up of several secondary samples (minimum 4) collected using the suggested methodology.
- Once taken, the samples are preserved in a portable cooler with ice, at temperatures below 4 degrees centigrade, temperature below which there is no glyphosate metabolization. The ice in the cooler is kept in airtight bags, so that, when it melts, the water does not enter into direct contact with the samples.

The glyphosate and AMPA analyses were made in a USDA-ARS laboratory at the University of Mississippi (Oxford, Mississippi).

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## EPA Letter to INL Regarding the Spray Program's Compliance with the Government of Colombia's Environmental Management Plan for Illicit Crop Eradication

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**February 23, 2004**

**United States Environmental Protection Agency**

**Washington, DC**

**20460**

**Office of Prevention, Pesticides and Toxic Substances**

February 23, 2004

Mr. Thomas H. Martin, Director

INL Latin American Programs

Department of State

2201 C Street, NW

Room 7811

Washington, DC 20520

Dear Mr. Martin:

This is a response to the Department of State's (DoS) request that the Environmental Protection Agency (EPA) review the Environmental Management Plan for the Illicit Crop Eradication Program in Colombia (EMP).

Specifically, DoS asked EPA to assess whether use of the herbicide mixture in Colombia is in accordance with the EMP, as included in the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002, (P.L. 108-7). As you know, in 2002, EPA was asked to consult regarding potential health and environmental effects from use of the glyphosate pesticide spray mixture for coca eradication. In 2003, our consultation considered both coca and poppy eradication efforts.

The Agency reviewed the EMP for comparison with applicable U.S. requirements for pesticide use and we believe the Plan contains appropriate types of activities for a pesticide spray program. The information in the EMP is generally in agreement with information provided to EPA for the previous consultations and discussed in EPA's 2002 and 2003 written assessments. The EMP provides additional information regarding the spray program, such as requirements for environmental monitoring, waste management, and contingency plans.

The EMP gives general descriptions of many activities related to this spray program, including references to relevant Colombian laws, which are to be followed. These activities include spray application requirements and restrictions, training and safety precautions for personnel who handle and apply the pesticide, handling of waste resulting from program operations, training public health workers to recognize and treat pesticide poisoning, handling health and environmental complaints, environmental monitoring, and contingency plans for emergencies. EPA recognizes that these types of activities are appropriate for pesticide spray programs and in general reflect similar activities which can be included for pesticide spray programs in the U.S., depending on the specific pesticide, use conditions, known potential risks, and Federal, state, or local laws. In general Federal requirements and restrictions for handling and using pesticides in the U.S. are specific to individual licensed pesticides for their permitted uses; requirements are stipulated on the labels of individual products.

There were two specific sections of the EMP that EPA would like to offer comments. First, according to the

Domestic Solid Waste Management Program, empty pesticide containers may be used for collection of garbage or for building barriers after containers are "completely washed and perforated." However, pesticide product requirements in the U.S. prohibits reuse of containers and suggests disposal by appropriate means, unless the containers are collected by the manufacturer for refilling. We would urge DoS to investigate with the manufacturer or the Government of Colombia methods for properly disposing of these containers rather than reusing them. The second specific comment relates to the Environmental Monitoring Program which states there is no significant impact on plants that surround the illicit crops being sprayed. As our consultation documents of the past two years have stated, glyphosate is highly toxic to many plants. Some levels of adverse effects are likely to occur to some non-target plants as a result of spray drift, as can be expected with herbicide applications. The Agency suggests an appropriate revision of this wording.

I hope this information is helpful. If you have additional questions, please let me know.

Sincerely,

Jay S. Ellenberger

Associate Director  
Field and External Affairs Division  
Office of Pesticide Programs

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**Annex 53-D**

**DEPARTMENT OF STATE INFORMATION PACKAGE ON THE CERTIFICATION OF THE  
AERIAL ERADICATION OF ILLICIT COCA AND OPIUM POPPY IN COLOMBIA, 2005**

*(U.S. Department of State)*





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## Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**April 22, 2005**

### **Memorandum of Justification Concerning the Secretary of State's 2005 Certification of Conditions Related to the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia**

The Andean Counterdrug Initiative section of the Foreign Operations, Export Financing and Related Programs Appropriations Act, 2005 (Division D, P.L. 108-447) lays out conditions under which assistance using funds appropriated under the heading Andean Counterdrug Initiative may be made available for the procurement of chemicals for use in aerial eradication of illicit crops. In particular, the legislation provides:

"That not more than 20 percent of the funds appropriated by this Act that are used for the procurement of chemicals for aerial coca and poppy fumigation programs may be made available for such programs unless the Secretary of State certifies to the Committees on Appropriations that: (1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws; and (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment: *Provided further*, That such funds may not be made available unless the Secretary of State certifies to the Committees on Appropriations that complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims: *Provided further*, That such funds may not be made available for such purposes unless programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for fumigation."

This memorandum provides justification for the Secretary of State's determination and certification to Congress that the above conditions have been met as required. In 2002, 2003, and 2004, the Secretary of State determined and certified to Congress on similar conditions concerning human health and environmental safety issues related to the Colombia spray program. These certifications were based on, among other information: all available scientific data on glyphosate, the herbicide used by the program; toxicological tests of the spray mixture (water, glyphosate, and a surfactant); active field verifications and complaint investigations; comprehensive human health monitoring; and thorough verbal and written consultations on the spray program with USDA and EPA. Because the Colombia aerial eradication program has not made any changes in the chemical formulation or application methods used for eradication of coca and opium poppy since the Secretary of State last certified to Congress on the Colombia spray program (November 29, 2004), these prior certifications serve as the foundation for the 2005 certification. These certifications and attachments can be found on the Internet at the following address:

<http://www.state.gov/p/in/rls/rpt/aeicc/>.

#### **1. The herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws.**

EPA told the Department of State in previous consultations that application rates for both coca and poppy eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States. Since neither the application rates used by the Colombia eradication program nor the

EPA-registered label recommendations have changed since 2004, the Secretary can certify to Congress that the herbicide mixture continues to be used in accordance with EPA label requirements for comparable use in the United States.

With respect to accordance with Colombian laws, the Colombian Minister of the Environment, Housing, and Territorial Development determined in July 2004 that the illicit crop eradication program is being conducted in compliance with the Environmental Management Plan for aerial eradication (EMP). Since that determination, there have been no substantive changes in the execution of the illicit crop eradication or the EMP.

The spray program's compliance with other Colombian laws governing aerial eradication was reconfirmed by the October 19, 2004 final resolution of a class action suit filed in 2002 against the aerial eradication program on environmental and human health grounds. The Colombian Administrative Tribunal, Colombia's highest administrative court, upheld the Government of Colombia's appeal of a 2003 lower court's ruling to halt aerial eradication.

The Colombian Administrative Tribunal ruling (an English language translation of which is included as Attachment 1) concluded that:

It cannot be accurately inferred from the evidence outlined that glyphosate causes irreversible damage to the environment when it is used for eradicating illicit crops; on the other hand, a number of facts lead to the conclusion that sprayed areas regenerate in a relatively short period of time and that many hectares of forest are destroyed when trees are felled by growers of illicit crops. (p. 10)

Accordingly, the Administrative Tribunal reversed a lower court's finding, and ordered that the Ministry of the Environment, Housing and Regional Development, Ministry of Social Protection, and National Directorate of Dangerous Drugs continue their oversight of the spray program. This finding represents a decisive legal endorsement of the methods used for spraying illicit crops in Colombia and of the integrity of existing environmental oversight mechanisms.

## **2. The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment**

The Secretary of State determined and certified in 2002, 2003, and 2004 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. After previous consultations with EPA, the Department and the Government of Colombia have incorporated all EPA recommendations to strengthen spray program controls and ensure increased protection against adverse effects to humans and the environment. The Department of State is not aware of any new evidence of risks or adverse effects to humans or the environment that have surfaced since the 2004 certification. Included below is a brief review of the conditions that allow the Secretary to recertify to Congress in 2005 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

In the 2004 EPA report, EPA offered the following assessment of human health concerns related to the spraying of coca and opium poppy in Colombia: "Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place." EPA also concluded, "that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent." A significant number of health care providers have received training and additional training is under way or planned.

As recognized in the 2003 report, the eradication program lowered its potential risks to wildlife and has responded appropriately to minimize off target drift. However, in the 2004 report the Agency stated, "Spray drift and potential side effect down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses." In 2003, EPA recognized that the Department of State was employing "Best Management Practices to minimize drift." The Department of State continues to follow these Best Management Practices and is ever vigilant regarding the manner in which the herbicide is applied.

The Government of Colombia regularly conducts studies to assess the spray program's environmental impact through ground truth verifications to estimate spray drift and the accuracy of the spray mixture application, and during verification of all legitimate complaints about alleged spraying of crops or vegetation that are not coca or opium poppy. After one recent verification, the Government of Colombia's Ministry of Environment, Housing, and Territorial Development characterized spray drift in the following fashion:

The drift effects that were observed in areas visited on a random basis were temporary in nature and small in extent, and basically consisted of partial defoliation of the canopy of very high trees. No complementary collateral damage from spraying activities was observed at the sites selected and verified. In sprayed areas that were subsequently abandoned, it was noted that vegetation was starting to grow again, the predominant types being grasses and a number of herbaceous species (Attachment 2)

The Department of State believes that the program's rigid controls and operational guidelines have decreased the likelihood of adverse impacts of the eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

This conclusion was recently confirmed by an objective, independent scientific study that evaluated the Colombia illicit crop eradication program and its potential human health and environmental considerations. The Inter-American Drug Abuse Control Commission (CICAD) section of the [Organization of American States \(OAS\)](#) commissioned a two-year risk assessment of human health and environmental effects related to aerial eradication of illicit crops in Colombia. The final report to CICAD is enclosed as Attachment 3 and can also be found at the following Internet Address: <http://www.cicad.oas.org/en/glyphosateFinalReport.pdf>. This study examined not just the possible human health and environmental effects of glyphosate, but the specific manner in which glyphosate is applied in Colombia to eradicate illicit crops, and reached the following conclusion: "(b)ased on all evidence and information presented above, the Panel concluded that the risk to humans and human health from the use of glyphosate and Cosmo-flux in the eradication of coca and poppy were minimal." (Conclusions, 6.1, p. 90). Similarly, with respect to potential risks to the Colombian environment, the panel concluded that "the risks to the environment from the use of glyphosate and Cosmo-Flux in the eradication of coca and poppy in Colombia were small in most circumstances." (Conclusions, 6.2, p. 90).

### **3. Complaints of harm to health or licit crops caused by such fumigation are investigated, and fair compensation is being paid for meritorious claims**

The Government of Colombia continues to compensate all meritorious claims fairly. On October 4, 2001, the GOC formally instituted a new process to compensate growers for legal crops sprayed in error. From that date through the end of March 2005, the Colombian National Police's Antinarcotics Directorate (DIRAN), the Government of Colombia agency responsible for complaint investigations, has received 5,270 such complaints.

Since the Secretary's 2004 spray certification to Congress, the DIRAN complaint investigations unit and other GOC entities that participate in complaint investigations have made substantial progress in eliminating the existing backlog of cases to be investigated and resolved. In October 2004, 1,063 cases were still under investigation. By the end of March 2005, 208 new cases had been received, 925 cases were under investigation, and 346 investigations had been completed. To date, of the 5,270 cases received, 4,345 investigations have been completed. During 2004, only four complaints were found to be valid and compensation payments were made, for a total of \$3,846. The spray program has compensated a total of 12 cases, amounting to almost \$30,000 in compensation.

The 925 outstanding complaints are currently being processed and verified by an interagency group including the DIRAN, agronomists from the Colombian Institute of Agriculture and Husbandry (ICA), the Ministry of Environment, and the Office of Dangerous Drugs (DNE). Flight database and on-site investigations continue, and compensation is being paid for all cases with merit after analysis of all considerations. Typically, compensation hinges on very basic issues, such as whether planes sprayed in the vicinity of the complainant's property within a five-day window of the alleged date of spraying; whether the complainant owns the allegedly sprayed property; whether the legal crop sprayed was intermixed with illegal crops; and whether the affected crop suffered damage from the spray mixture, as opposed to fungus, insects, or other causes. If the spray pilots have erred and accidentally sprayed licit crops, compensation is paid to the farmer for the loss of the crop, based on current market value of the crop.

Field verification is extremely dangerous and resource intensive; and it is an unavoidably methodical process. Because of the high risks involved for all personnel who conduct site visits, the primacy of security will dictate the pace of investigations in the future. Although logistical considerations (security concerns, personnel availability, and helicopter resources) are part of the reason why complaints cannot be resolved in the field more quickly, the greatest logjam in this system is the number of false complaints which handicap the ability of field investigators to close cases more quickly. This was reconfirmed during several 2004 site investigations when complainants related stories of narco-terrorist groups forcing them to damage their own crops and falsify complaints in order to discredit the aerial spraying.



The Department of State is investigating possibilities for improving the complaints resolution process through the use of aircraft mounted imagery platforms that would make in situ verification safer, cheaper, and faster in the future. The Colombian Ministry of Justice has also refined the claims procedures, seeking to streamline the process and to deter fraudulent claims. These procedures will include a warning that a complainant found to have coca growing on his/her property would be subject to prosecution for violations of Colombian law. The Government of Colombia has also begun processes for seizure and forfeiture of property used for growing illicit crops. Presumably, these steps will reduce the many false claims that have flooded the complaint system, and facilitate investigation of and restitution for legitimate claims.

**4. Programs are being implemented by the USAID, the GOC, or other organizations in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for spraying**

Thus far in calendar year 2005, the Colombian aerial eradication program has sprayed (or anticipates spraying) coca in the departments of Putumayo, Nariño, Guaviare, Meta, Bolivar, Cauca, Norte de Santander, Vichada, Antioquia, Vaupes, Cordoba, Caldas, Arauca, Cesar, Valle del Cauca and La Guajira and opium poppy in the departments of Cauca, Huila, Tolima, and Nariño. In each of these areas, USAID, the GOC, and/or other organizations are implementing alternative development programs to provide legal income generating opportunities to illicit crop growers who agree to accept benefits after eradicating their crops of coca or opium poppy.

For the purposes of this report, the Department of State interprets the term "area" as a Colombian department. This is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components cannot always be co-implemented in every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca and opium poppy are often cultivated in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than those for illegal merchandise. Dispersing development activities to remote areas often raises costs and security risks, while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils, inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of the 2005 Consolidated Appropriations Act, narco-terrorist and paramilitary groups operate in many illicit crop-growing zones and make the presence of alternative development projects inadvisable in such locations. These narco-terrorist groups reap immense profit from the illegal trade, pose grave security risks for development personnel, and slow down project implementation.

Despite these obstacles to alternative development in Colombia, USAID and the GOC are moving forward with a robust alternative development program in coca and opium producing areas. Now in the fourth year of Plan Colombia alternative development coordination with the GOC and the fourth year of project implementation, USAID's alternative development program has supported a total of 62,964 hectares of licit crops, 31,461 hectares of forest land, and completed 918 infrastructure projects in coca and poppy growing areas through March 31, 2005. These efforts have benefited 54,780 families. These achievements in each category have surpassed program goals. Equally important, USAID has strengthened a total of 281 NGOs, cooperatives, and national institutions so that alternative development and community building activities will be more sustainable.

The alternative development projects being carried out by USAID and GOC organizations in each area where the spray program eradicates illicit crops are described below.

**Antioquia**

An \$18.5 million USAID project directed at alternative development, implemented by the Pan-American Development Foundation (PADF), supports short-term production activities for immediate income and employment needs. It also seeks to establish longer-term crops such as natural rubber (caucho) and cacao to provide sustainability, as well as complementary productive infrastructure. Projects of cacao, caucho, and agro forestry would cover an area of 2,017 hectares and would benefit 594 families in El Bajo Cauca.

An \$8.5 million USAID Dairy project is carried out by Land O'Lakes (LOL) to promote sustainable dairy production, processing and marketing involving small farmers. This program is also operating in Nariño.

USAID also funds an activity titled Aid to Artisans (ATA), which is carrying out a \$4.3 million project to strengthen local capacity for production and marketing of crafts. ATA is also operating in Atlántico, Boyacá,

Caldas, Cauca, Cesar, Córdoba, Huila, Magdalena, Nariño, Quindío, Santander, Sucre, Tolima, and Valle del Cauca.

USAID's successful \$38 million Colombia Agribusiness Partnership Program (CAPP), implemented by Associates in Rural Development (ARD), is to promote private sector involvement to help agricultural producers and others involved in illicit products to shift into legal activities or remain uninvolved in illicit coca and poppy production. The project targets rural families in coca/opium poppy regions and threatened zones and assists them by supporting strategic alliances between agribusiness firms and these families. In Antioquia, the program supports small farmers in producing fruit for processing into pulp, jute and African palm. The program also operates in Atlántico, Bolívar, Caldas, Casanare, Cauca, Cesar, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

The USAID-funded Democratic Local Governance Program, also implemented by ARD, uses USAID funds to support institutional strengthening activities in municipal-level development planning, municipal management, public services, finance and revenue, public information, and project management. In Antioquia, the program focuses on the Bajo Cauca region and has implemented projects to strengthen municipal administrations in these areas. In addition, some funding has been invested in seven social infrastructure projects in the same area. The program also operates in selected municipalities in Putumayo, Nariño, Cauca, Valle del Cauca, Huila, Tolima, and Bolívar.

The \$23 million Colombia Forestry Development Program (CFDP), funded directly by USAID and implemented by Chemonics, has a nucleus in Northeastern Antioquia where it is focusing on promoting pine plantations and efficient industrial processing models. The estimated CFDP investment in Antioquia over the life of the project totals \$6,050,000. A portion of this assistance directly benefits indigenous communities in Mutata and Chigorodo. It has another nucleus along the Atrato River and Uraba region that provides assistance to natural forests, agro forestry schemes, plantations and the Familias Guardabosques nucleus in Turbo and Necocli. In Nariño this program is directed at community-based natural forest management. In Cauca, CFDP has invested in natural forest management in the municipality of Guapi to benefit Afro-Colombian communities.

USAID's \$12 million Colombia Enterprise Development (CED) project supports small and medium enterprise development in secondary cities. CED is also operating in Atlántico, Caldas, Quindío, Risaralda, Santander, Valle del Cauca, and Tolima.

The Colombian Government's Investment Fund for Peace (FIP), a \$19.4 million investment, is generating employment through infrastructure, licit crop production (coffee rehabilitation, agro forestry), skills training, and education/nutrition aid to poor families.

### **Bolivar**

The aforementioned CFDP, financed by USAID, has a nucleus along Magdalena River focusing mainly on plantations such as Eucalyptus. CFDP investment in the nucleus totals approximately \$2 million, of which an estimated \$1 million will go to Bolivar.

USAID's alternative development program carried out by PADF is supporting short cycle production activities to address immediate income and employment requirements; longer-term crops such as natural rubber and cacao to provide sustainability; and complementary productive infrastructure. The project supports 2450 hectares of licit crops benefiting 661 families.

USAID's CAPP is also promoting private sector involvement with farmers to produce cacao, African palm, and yucca (cassava).

In Bolivar, the Democratic Local Governance Program works in southern Bolivar strengthening municipal administrations in municipal management. In addition to this work, the program has invested USAID funds in 10 social infrastructure projects in Bolivar.

The GOC is active in Bolivar supporting licit production activities such as palm oil and cassava production.

### **Caquetá**

USAID's centerpiece Colombia Alternative Development (CAD), implemented by Chemonics, is a \$97.3 million project; in Caquetá it is fostering a short-term crop production for food security and long-term income generation activities such as rubber production.

USAID funds a \$1.8 million Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team (ACT) to assist Colombian indigenous communities in food security, health, local governance, and land management. Activities under this program are also being carried out in the departments of Putumayo and Vaupés. The GOC is also supporting institutional strengthening for

small-scale brown sugar producers and life plans (planes de vida) for indigenous communities.

In Caqueté, the Democratic Local Governance Program has implemented 16 social infrastructure projects. In addition to this work, the program provided technical assistance and training to community leaders and public officials in citizen participation and municipal management. The program completed its fieldwork in Caqueté on March 2004. However, field presence through governance strengthening activities, particularly in public services, is expected to continue until December 2005.

### **Cauca**

USAID's CAD activities support small-scale irrigation for the production and marketing of short-season, high-value crops, including the growing, processing, and marketing of gourds for artisan and craft products and the value-added processing of wood products from tree plantations in indigenous areas.

The CFDP invested approximately \$100,000 in natural forest management in the municipality of Guapi -Cauca to benefit Afro-Colombian communities.

USAID Alternative Development activities also include a \$9.8 million project, implemented by ACDI/VOCA, which promotes specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The CAPP project is supporting private sector investments in hot peppers, jute, and cacao.

USAID Democratic Local Governance Program efforts in Cauca have focused on working with community leaders and public officials to improve municipal management practices. As for social infrastructure projects, the program funded the implementation of 52 projects that total approximately \$1,880,000.

The Aid to Artisans project is enhancing local capacity for production and marketing of crafts as licit income generating alternatives.

The Colombians Supporting Colombians program works in municipal development with emphasis on participatory planning. This is put into practice with the construction of small-scale infrastructure projects with community partnership and mayors involvement. The program also administers a credit fund, directly and via local microfinance institutions, to offer microenterprises credit to invest in working capital and fixed assets to enhance or expand their businesses.

The GOC is supporting fruit production and complementary activities for the coffee renewal program.

### **Caldas**

USAID's Specialty Coffee program is also promoting specialty coffee production, processing, and marketing in Caldas's illicit crop growing areas.

The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

### **Cesar**

The Aid to Artisans project is carrying out activities to strengthen the production and marketing of crafts.

The Colombia Agribusiness Partnership Program (CAPP) is supporting private sector investments for small farmers producing crops such as cacao, fruits and African palm. The GOC is also supporting cacao and oil palm production in this region.

### **Córdoba**

The Aid to Artisans project is supporting the strengthening of local capacity to produce and market crafts by artisans in the department.

USAID's CAPP is supporting private sector activities in cacao and passion fruit production.

### **Guajira**

USAID's CAPP is supporting private sector activities in crops such as passion fruit and cacao.

### **Guaviare**

The GOC is supporting rubber (*caucho*) production and agro forestry.

### **Guainia**

The GOC is providing institutional strengthening to indigenous community associations.

**Huila**

USAID's Specialty Coffee project is promoting specialty coffee production, processing, and marketing in poppy growing areas.

USAID's CAD program is supporting the production and marketing of passion fruit.

The CAPP program is supporting cacao and fruit production, while the Aid to Artisans project is promoting the production and marketing of crafts.

Democratic Local Governance Program work in Huila is focused on citizen participation, municipal management, and public information. The program has also implemented 57 social infrastructure projects that total approximately \$1,997,000.

The GOC is supporting the strengthening of cultural values in indigenous communities, fruit production, fishponds, and complementary activities for the coffee renewal program.

**Magdalena**

The CFDP has a forestry nucleus along the lower Magdalena River focusing mainly on plantations such as Eucalyptus. CFDP investment in the nucleus totals approximately \$2 million, of which an estimated \$500,000 will go to Magdalena.

USAID's CAPP is also providing technical and financial support in Magdalena to private sector initiatives to produce African palm, banana, cacao, and exotic fruits.

**Meta**

The GOC is supporting activities in cacao, cassava, buffer zones in natural parks, and technical assistance for local governments.

The USAID CAPP program is promoting private sector investments with small farmers to produce African palm.

**Nariño**

The Specialty Coffee project is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Nariño.

CFDP has a forestry nucleus along three river systems in Nariño focusing mainly on community-based natural forest management. CFDP investment in the nucleus totals approximately \$1.8 million and directly benefits the Afro-Colombian community.

The United Nations Office on Drugs and Crime (UNODC) plans to implement a USAID-funded \$1.8 million program that provides a range of agricultural and forestry projects.

In Nariño, the Democratic Local Governance Program is focused on development planning and finance and revenue, particularly in assistance to municipal administrations in the formulation of tax codes. Forty-two (42) social infrastructure projects, totaling approximately \$1,322,000, have been implemented in this department.

The USAID Dairy Promotion program is promoting sustainable small farm dairy production, processing and marketing, while the CAPP program is supporting small farmer, private sector projects in cacao and African palm production.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in Nariño.

The CFDP will be supporting forest policy changes and carrying out activities for the improved production, processing and marketing of forest and wood products in Nariño, as well as in Antioquia, Chocó, and Magdalena.

The GOC is supporting activities in coffee renewal and oil palm production.

**Norte de Santander**

The USAID Colombia Agribusiness Partnership Program (CAPP) program is supporting private sector initiatives with small farmers in the production and processing of African palm and cacao.

The USAID alternative development activities implemented through PAFD are working in association with ASOHESAN (the Santander rubber producer's association) to support the cultivation of 1,652 hectares of rubber that would benefit 411 families. The project includes as well the establishment of 826 hectares of short-term crops and 137 food security systems (vegetable gardens, small animal husbandry).

The GOC is supporting palm oil crop production in the department.

#### **Putumayo**

The CAD project is supporting activities in Putumayo for short and medium-term crop production with farmers and indigenous groups, hearts of palm production, processing and marketing; rubber production, processing and marketing; forest management and value added processing and utilization of forest and wood products; infrastructure projects, including bridge construction and road improvements, schools, and health facilities. As part of the development of production and marketing chains, support is being provided for the private sector involvement in processing plants and marketing for cassava chips, black pepper and plantain; tropical flowers and foliage, vanilla production, as well as for medicinal plants and essential oils.

Democratic Local Governance Program work in Putumayo is focused on strengthening public service providers and on enhancing municipal finance and revenue capabilities. A total of 20 Social Infrastructure (SIF) projects have been implemented in this department. The program completed its fieldwork in Putumayo on March 2004. However, field presence through governance strengthening activities, particularly in public services, is expected to continue until December 2005.

U.S. Army Corps of Engineers' \$6.7 million rural infrastructure project, funded by USAID, carried out road, sewage, and water treatment activities that generated employment in the region. Current complementary work is being carried out to improve the water treatment plant in Villa Garzon.

The Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team, is supporting indigenous communities with improved food security, health, local governance, and land management.

#### **Santander**

The GOC is supporting cocoa and oil palm production in this department.

The CAPP is supporting private sector initiatives with small farmers in the production of cacao and African palm.

#### **Tolima**

The CAD project is supporting an activity to increase annual crop production for food security and to increase income and employment generation in the longer term through forestry, livestock, pasture improvement, and vegetable production.

The Specialty Coffee activity is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

The Colombia Enterprise Development (CED) project, funded by USAID and implemented by CARANA Corporation, is supporting small and medium enterprise development in Colombia's secondary cities including those in Tolima.

The Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in the department, while the ARD/CAPP is supporting private sector projects in fruits, natural rubber and cacao production.

Democratic Local Governance Program activities in Tolima focus on technical assistance in development planning to community leaders and public officials. In addition, the program has provided funds totaling approximately \$747,000 for 18 social infrastructure projects.

The Colombians Supporting Colombians program works in municipal development with emphasis on participatory planning. This is put into practice with the construction of small-scale infrastructure projects with community partnership and mayor's involvement. The program also administers a credit fund, directly and via local microfinance institutions, to offer microenterprises credit to invest in working capital and fixed assets to enhance or expand their businesses.

The GOC is supporting cacao and coffee activities.

#### **Valle del Cauca**

In Valle del Cauca, the Democratic Local Governance Program has focused on technical assistance in development planning to public officials. Social infrastructure projects began April 2005.

The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

#### **Vaupes**

The Sustainable Development for Indigenous Colombian Communities project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

**Vichada**

The GOC is providing institutional strengthening to indigenous community associations.

The preceding four sections and attachments form the basis of the Justification for the Secretary of State's 2005 Certification of Conditions Related to the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia.

**Attachments:**

1. [Colombian Administrative Tribunal ruling of October 19, 2004, English language version](#)
2. [Government of Colombia's Ministry of Environment, Housing, and Territorial Development Ruling No. 707, July 26, 2004, English language version](#)
3. [Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia, a report prepared for the Inter-American Drug Abuse Control Commission \(CICAD\) section of the OAS, March 31, 2005 \[PDF format\]](#)

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**Annex 53-E**

**DEPARTMENT OF STATE INFORMATION PACKAGE ON THE CERTIFICATION OF THE  
AERIAL ERADICATION OF ILLICIT COCA AND OPIUM POPPY IN COLOMBIA, 2006**

*(U.S. Department of State)*







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## Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia

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BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS

**Washington, DC**

**August 22, 2006**

### **Memorandum of Justification Concerning the Secretary of State's 2006 Certification of Conditions Related to the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia**

The Andean Counterdrug Initiative section of the Foreign Operations, Export Financing and Related Programs Appropriations Act, 2006 (P.L. 109-102) lays out conditions under which assistance using funds appropriated under the heading Andean Counterdrug Initiative may be made available for the procurement of chemicals for use in aerial eradication of illicit crops. In particular, the legislation provides:

"That not more than 20 percent of the funds appropriated by this Act that are used for the procurement of chemicals for aerial coca and poppy fumigation programs may be made available for such programs unless the Secretary of State certifies to the Committees on Appropriations that: (1) the herbicide is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws; and (2) the herbicide, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species: *Provided further*, That such funds may not be made available unless the Secretary of State certifies to the Committees on Appropriations that complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims: *Provided further*, That such funds may not be made available for such purposes unless programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for fumigation."

This memorandum provides justification for the Secretary of State's determination and certification to Congress that the above conditions have been met as required. In 2002, 2003, 2004, and 2005 the Secretary of State determined and certified to Congress on similar conditions concerning human health and environmental safety issues related to the Colombia spray program. These certifications were based on, among other information: all available scientific data on glyphosate, the herbicide used by the program; toxicological tests of the spray mixture (water, glyphosate, and a surfactant); active field verifications and complaint investigations; comprehensive human health monitoring; and thorough verbal and written consultations on the spray program with USDA and EPA.

Because the Colombia aerial eradication program has not made any changes in the chemical formulation or application methods used for eradication of coca and opium poppy since the Secretary of State last certified to Congress on the Colombia spray program (July 30, 2005), these prior certifications serve as the foundation for the 2006 certification. These certifications and attachments can be found on the Internet at the following address:

<http://www.state.gov/p/in/rls/rpt/aeicc/c15752.htm>

#### **1. The herbicide is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws.**

EPA told the Department of State in previous consultations that application rates for both coca and poppy eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States. Since neither the application rates used by the Colombia eradication program nor the EPA-registered label recommendations have changed since 2004, the Secretary can certify to Congress that the herbicide mixture continues to be used in accordance with EPA label requirements for comparable use in the United States.

With respect to accordance with Colombian laws, the Colombian Minister of the Environment, Housing, and Territorial

Development determined in July 2004 that the illicit crop eradication program is being conducted in compliance with the Environmental Management Plan for aerial eradication (EMP). Since that determination, there have been no substantive changes in the execution of the illicit crop eradication or the EMP.

The spray program's compliance with other Colombian laws governing aerial eradication was reconfirmed by the October 19, 2004 final resolution of a class action suit filed in 2002 against the aerial eradication program on environmental and human health grounds. The Colombian Administrative Tribunal, Colombia's highest administrative court, upheld the Government of Colombia's appeal of a 2003 lower court's ruling to halt aerial eradication.

The Colombian Administrative Tribunal ruling (an English-language translation of which is included as Attachment 1) concluded that:

It cannot be accurately inferred from the evidence outlined that glyphosate causes irreversible damage to the environment when it is used for eradicating illicit crops; on the other hand, a number of facts lead to the conclusion that sprayed areas regenerate in a relatively short period of time and that many hectares of forest are destroyed when trees are felled by growers of illicit crops. (p. 10)

Accordingly, the Administrative Tribunal reversed a lower court's finding and ordered that the Ministry of the Environment, Housing and Regional Development, Ministry of Social Protection, and National Directorate of Dangerous Drugs continue their oversight of the spray program. This finding represents a decisive legal endorsement of the methods used for spraying illicit crops in Colombia and of the integrity of existing environmental oversight mechanisms.

**2. The herbicide, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species.**

The Secretary of State determined and certified in 2002, 2003, 2004, and 2005 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. After previous consultations with EPA, the Department and the Government of Colombia have incorporated all EPA recommendations to strengthen spray program controls and ensure increased protection against adverse effects to humans and the environment. The Department of State is not aware of any new evidence of risks or adverse effects to humans or the environment that have surfaced since the 2005 certification. Included below is a brief review of the conditions that allow the Secretary to recertify to Congress in 2006 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment, including endemic species.

In the 2004 EPA report, EPA offered the following assessment of human health concerns related to the spraying of coca and opium poppy in Colombia: "Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place." EPA also concluded, "that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent." A significant number of health care providers have received training and additional training is under way or planned.

As recognized in the 2003 report, the eradication program lowered its potential risks to wildlife and has responded appropriately to minimize off target drift. However, in the 2004 report the EPA stated, "Spray drift and potential side effect down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses." In 2003, EPA recognized that the Department of State was employing "Best Management Practices to minimize drift." The Department of State continues to follow these Best Management Practices and is ever vigilant regarding the manner in which the herbicide is applied.

The Government of Colombia regularly conducts studies to assess the spray program's environmental impact through ground truth verifications to estimate spray drift and the accuracy of the spray mixture application and during verification of all legitimate complaints about alleged spraying of crops or vegetation that are not coca or opium poppy. After one recent verification, the Government of Colombia's Ministry of Environment, Housing, and Territorial Development characterized spray drift in the following fashion:

The drift effects that were observed in areas visited on a random basis were temporary in nature and small in extent, and basically consisted of partial defoliation of the canopy of very high trees. No complementary collateral damage from spraying activities was observed at the sites selected and verified. In sprayed areas that were subsequently abandoned, it was noted that vegetation was starting to grow again, the predominant types being grasses and a number of herbaceous species (Attachment 2, p. 4)

The Department of State believes that the program's rigid controls and operational guidelines have decreased the likelihood of adverse impacts of the eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

This conclusion was confirmed by an objective, independent scientific study that evaluated the Colombia illicit crop eradication program and its potential human health and environmental considerations. The Inter-American Drug Abuse Control Commission (CICAD) section of the [Organization of American States \(OAS\)](#) commissioned a two-year risk assessment of human health and environmental effects related to aerial eradication of illicit crops in Colombia. The final report to CICAD is enclosed as Attachment 3 and can also be found at the following Internet Address: <http://www.cicad.oas.org/en/glyphosateFinalReport.pdf>

This study examined not just the possible human health and environmental effects of glyphosate, but the specific manner in which glyphosate is applied in Colombia to eradicate illicit crops, and reached the following conclusion: " (b)ased on all evidence and information presented above, the Panel concluded that the risk to humans and human health from the use of glyphosate and Cosmo-flux in the eradication of coca and poppy were minimal." (Conclusions, 6.1, p. 90). Similarly, with respect to potential risks to the Colombian environment, the panel concluded that "the risks to the environment from the use of glyphosate and Cosmo-Flux in the eradication of coca and poppy in Colombia were small in most circumstances." (Conclusions, 6.2, p. 90).

This study also concluded that the "Risks of direct effects in terrestrial wildlife such as mammals and birds were judged to be negligible as were those to beneficial insects such as bees." (Conclusions, 6.2, p. 90). This is a far-reaching and important judgment which addresses the risk from the spray program faced by all terrestrial fauna potentially exposed to the spray: not only those species endemic to Colombia, but any introduced species present as well.

This does not mean that the spraying of glyphosate poses zero risk. The study goes on to state that "Moderate risks to some aquatic wildlife may exist in some locations where shallow and static water bodies are located in close proximity to coca fields and are accidentally over-sprayed. However, when taken in the context of the environmental risks from other activities associated with the production of coca and poppy, in particular, the uncontrolled and unplanned clearing of pristine lands in ecologically important areas for the purposes of planting the crop, the added risks associated with the spray program are small." (Conclusions, 6.2, p. 91).

Despite the limited risk represented by the spray program, the Department of State, in consultation with Congress, is supporting further CICAD research to better understand the level of risk that could be posed to Colombia's aquatic amphibians as a result of potential overspray of amphibian habitat. Preliminary results of this continued study confirm that the glyphosate mixture as used in Colombia has low toxicity for aquatic amphibians. The Department will submit to Congress a separate report on this work when the study has been completed.

These studies, as well as third-party research on glyphosate, warrant a certification by the Secretary of State that the spray program does not pose unreasonable risks or adverse affects to Colombia's endemic species.

### **3. Claims of harm to health or licit crops caused by such fumigation are investigated, and fair compensation is being paid for meritorious claims**

The Government of Colombia continues to compensate all meritorious claims fairly. On October 4, 2001, the Government of Colombia formally instituted a new process to compensate growers for legal crops sprayed in error. From that date through the end of March 2006, the Colombian National Police's Antinarcotics Directorate (DIRAN), the Government of Colombia agency responsible for complaint investigations, has received 5,974 such claims. Of these, 5,511 investigations were completed as of March 31, 2006.

Claims are processed and verified by an interagency group including the DIRAN, agronomists from the Colombian Institute of Agriculture and Husbandry (ICA), the Ministry of Environment, and the Office of Dangerous Drugs (DNE). In 2005, 12 claims were found to be valid and \$123,000 was paid as compensation. To date, the spray program has paid \$160,000 compensation in 28 cases.

The 462 outstanding claims are being processed and verified by the interagency claims investigations group. Flight database and on-site investigations continue, and compensation is being paid for all cases with merit after analysis of all considerations. Typically, compensation hinges on basic issues, such as whether planes sprayed in the vicinity of the claimant's property within a five-day window of the alleged date of spraying; whether the claimant owns the allegedly sprayed property; whether the legal crop sprayed was intermixed with illegal crops; and whether the affected crop suffered damage from the spray mixture, as opposed to fungus, insects, or other causes. If the spray pilots have erred and accidentally sprayed licit crops, compensation is paid for the loss of the crop, based on current market value of the crop.

Field verification is extremely dangerous and resource intensive; and it is an unavoidably methodical process. Because of the high security risks involved for all personnel who conduct site visits, the primacy of security will dictate the pace of investigations in the future. Although logistical considerations (security concerns, personnel availability, and helicopter resources) are part of the reason why claims cannot be resolved in the field more quickly, the greatest logjam is the number of claims which turn out to be false. For example, in May 2006, the claims investigations group spent three days investigating some 75 claims that program pilots had sprayed African palm near Tumaco, Nariño. The eradication program spent over \$100,000 in helicopter flight hours investigating these claims and found that in every case coca was interspersed with the palm.

The Department of State plans to improve the claims resolution process through aircraft mounted imagery platforms to make in situ verification safer, cheaper, and faster in the future. The Government of Colombia has also begun processes for seizure and forfeiture of property used for growing illicit crops, although security-related and bureaucratic hurdles are significant. We expect improvements in asset forfeiture in Colombia will reduce the many false claims that have flooded the complaint system and facilitate even more prompt investigation of and restitution for legitimate claims.

**4. Programs are being implemented by the USAID, the Government of Colombia, or other organizations in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for spraying.**

In 2006, the Colombian aerial eradication program has sprayed (or anticipates spraying) coca in the departments of Putumayo, Nariño, Guaviare, Meta, Bolivar, Cauca, Norte de Santander, Vichada, Antioquia, Vaupes, Cordoba, Caldas, Arauca, Cesar, Valle del Cauca and La Guajira and opium poppy in the departments of Cauca, Huila, Tolima, and Nariño. In each of these areas, USAID, the Government of Colombia, and/or other organizations are implementing alternative development programs to provide legal income generating opportunities to illicit crop growers who agree to accept benefits after eradicating their crops of coca or opium poppy.

For the purposes of this report, the Department of State interprets the term "area" as a Colombian department. This designation is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components cannot always be implemented in every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca and opium poppy are often cultivated in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than those for illegal merchandise. Dispersing development activities to remote areas often raises costs and security risks, while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils, inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of the 2005 Consolidated Appropriations Act, narco-terrorist and paramilitary groups operate in many illicit crop-growing zones and make the presence of alternative development projects inadvisable in such locations. These narco-terrorist groups reap immense profit from the illegal trade, pose grave security risks for development personnel, and slow down project implementation.

Despite these obstacles to alternative development in Colombia, USAID and the Government of Colombia are moving forward with a robust alternative development program in coca and opium producing areas. USAID's alternative development program has supported 97,391 hectares of licit crops, 63,493 hectares of forest land, and completed 1,117 infrastructure projects in coca and poppy growing areas through March 31, 2006. These efforts have benefited 75,638 families. These achievements in each category have surpassed program goals. Equally important, USAID has strengthened a total of 1,265 small, medium or large private sector enterprises so that alternative development and community building activities will be more sustainable.

The alternative development projects being carried out by USAID and Government of Colombia organizations in each area where the spray program eradicates illicit crops are described below.

**Antioquia**

An \$18.5 million USAID project directed at alternative development, implemented by the Pan-American Development Foundation (PADF), supports short-term production activities for immediate income and employment needs. It also seeks to establish longer-term crops such as natural rubber (caucho) and cacao to provide sustainability, as well as complementary productive infrastructure. Projects of cacao, caucho, and agro-forestry will cover an area of 2,017 hectares and benefit 594 families in El Bajo Cauca.

An \$8.5 million USAID Dairy project is carried out by Land O'Lakes (LOL) to promote sustainable dairy production, processing and marketing involving small farmers. This program is also operating in Nariño.

USAID also funds an activity titled Aid to Artisans (ATA), which is carrying out a \$4.3 million project to strengthen local capacity for production and marketing of crafts. ATA is also operating in Atlántico, Boyacá, Caldas, Cauca, Cesar, Córdoba, Huila, Magdalena, Nariño, Quindío, Santander, Sucre, Tolima, and Valle del Cauca.

USAID's successful \$41.5 million Colombia Agribusiness Partnership Program (CAPP), implemented by Associates in Rural Development (ARD), is to promote private sector involvement to help agricultural producers and others involved in illicit products to shift into legal activities or remain uninvolved in illicit coca and poppy production. The project targets rural families in coca/opium poppy regions and threatened zones and assists them by supporting strategic alliances between agribusiness firms and these families. In Antioquia, the program supports small farmers in producing fruit for processing into pulp, jute and African palm. The program also operates in Atlántico, Bolívar, Caldas, Casanare, Cauca, Cesar, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

The USAID-funded Democratic Local Governance Program and implemented by Associates in Rural Development

(ARD), supports institutional strengthening activities relevant to municipal-level development planning, municipal management, public services, finance and revenue, public information, and project management. In Antioquia, the program focuses on the Bajo Cauca region and supports projects to strengthen municipal administrations in the region. In addition, a total of \$527,000 of USAID funds were invested in seventeen social infrastructure projects in the same area, leveraging funds contributed from the Department, local governments, and communities of up to 54 percent of the total cost. This region will be included under the new Areas for Municipal Level Alternative Development (ADAM) program.

The \$18.6 million Colombia Forestry Development Program (CFDP), funded directly by USAID and implemented by Chemonics, has a nucleus in Northeastern Antioquia where it is focusing on promoting pine plantations and efficient industrial processing models. CFDP activities in Antioquia include plantations, *Familias Guardabosques* and natural forests. CFDP works closely with the *Organización Indígena de Antioquia* in Chigorodó and Mutatá and Cocomacia and Corpourabé en Vigía del Fuerte to implement natural forestry projects totaling approximately \$1,100,000. *Familias Guardabosques* activities are concentrated in Necoclí and Turbo and total approximately \$650,000. Plantation work is located in Necoclí and totals approximately \$10,000.

USAID's \$12 million Colombia Enterprise Development (CED) project supports small and medium enterprise development in secondary cities. CED is also operating in Atlántico, Caldas, Quindío, Risaralda, Santander, Valle del Cauca, and Tolima.

The Colombian Government's Investment Fund for Peace (FIP), a \$19.4 million investment, is generating employment through infrastructure, licit crop production (coffee rehabilitation, agro-forestry), skills training, and education/nutrition aid to poor families.

### **Bolivar**

The previously mentioned ADAM program will support cacao, rubber and other alternative development activities in selected municipalities along with municipal strengthening activities in these same municipalities.

CFDP supports plantation efforts in Bolivar in the following municipalities: Zambrano, Fundación, Sabanas de San Angel, Becerril and Agustín Codazzi totaling an estimated \$400,000.

USAID's alternative development program carried out by PADF is supporting short cycle production activities to address immediate income and employment requirements; longer-term crops such as natural rubber and cacao to provide sustainability, and complementary productive infrastructure. The project supports 2450 hectares of licit crops benefiting 661 families.

USAID's CAPP is also promoting private sector involvement with farmers to produce cacao, African palm, and yucca (cassava).

In Bolivar, the Democratic Local Governance Program worked in 7 municipalities in southern Bolivar strengthening municipal administrations in the areas of transparency and accountability. The municipalities of Santa Rosa and Simitá are the main beneficiaries of the provided technical assistance package. Seven other municipalities received punctual and specific technical assistance and training. In total, the program invested \$624,589 in USAID funds for social infrastructure projects and leveraged a counterpart contribution of up to 53 percent of the total cost. This region will be included under the new ADAM program.

The Government of Colombia supports licit production activities such as palm oil and cassava production in Bolivar.

### **Caquetá**

USAID's centerpiece Colombia Alternative Development (CAD), implemented by Chemonics, is a \$97.3 million project; in Caquetá it is fostering short-term crop production for food security and long-term income generation activities such as rubber production.

USAID funds a \$1.8 million Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team (ACT) to assist Colombian indigenous communities in food security, health, local governance, and land management. Activities under this program are also being carried out in the departments of Putumayo and Vaupés. The Government of Colombia is also supporting institutional strengthening for small-scale brown sugar producers and life plans (planes de vida) for indigenous communities.

In Caquetá, the Democratic Local Governance Program implemented 16 social infrastructure projects, investing USAID funds for a total of \$587,400 and leveraging 23 percent of total cost. In addition, the program provided technical assistance and training to community leaders and public officials in citizen participation and municipal management. The program completed its activities in Caquetá on March 2004. However, field presence through governance strengthening activities, particularly in public services, continued until December 2005, by supporting the creation and operation of a legacy institution (*Empresa de Administración Pública Cooperativa*)-EMCOOPCAQUETA. This enterprise will provide on-going training and technical assistance in water and basic sanitation to municipalities and will fund infrastructure investments. This region is not included under the new ADAM program.

### Cauca

USAID's CAD activities support small-scale irrigation for the production and marketing of short-season, high-value crops, including the growing, processing, and marketing of gourds for artisan and craft products and the value-added processing of wood products from tree plantations in indigenous areas.

CFDP is supporting Afro-Colombian communities in Guapi to manage their natural forestry resources. Technical assistance is also provided to communities in Timbiquí. CFDP's investment in natural forestry in the department totals approximately \$420,000.

USAID Alternative Development activities also include a \$9.8 million project, implemented by the Agricultural Cooperative Development International and Volunteer in Overseas Cooperative Assistance (ACDI/VOCA), which promotes specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The CAPP project is supporting private sector investments in hot peppers, jute, and cacao.

USAID Democratic Local Governance Program efforts in Cauca have focused mainly on working with community leaders and public officials to improve municipal management practices. As for social infrastructure projects, the program funded the implementation of 64 projects that total approximately \$2,288,630 and leveraged 41 percent of the total costs. This region will be included under the new ADAM program.

The Aid to Artisans project is enhancing local capacity for production and marketing of crafts as licit income generating alternatives.

The Colombians Supporting Colombians program works in municipal development with emphasis on participatory planning. This objective is put into practice with the construction of small-scale infrastructure projects with community partnerships and mayoral involvement. The program also administers a credit fund, directly and via local microfinance institutions, to offer microenterprises credit to invest in working capital and fixed assets to enhance or expand their businesses.

The Government of Colombia is supporting fruit production and complementary activities for the coffee renewal program.

### Caldas

USAID's Specialty Coffee program is also promoting specialty coffee production, processing, and marketing in Caldas's illicit crop growing areas.

The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

### ♦ sar

The ADAM program will be carrying out alternative development and municipal strengthening activities in selected municipalities. The assessment of these activities is just beginning to be discussed with Departmental and local government authorities, the private sector and potential beneficiaries.

The Aid to Artisans project is carrying out activities to strengthen the production and marketing of crafts.

The Colombia Agribusiness Partnership Program (CAPP) is supporting private sector investments for small farmers producing crops such as cacao, fruits and African palm. The GOC is also supporting cacao and oil palm production in this region.

### ♦ rdoba

The ADAM project will be assessing the possibility of alternative development activities such as rubber and cacao as well as local government strengthening activities in the Department.

The Aid to Artisans project is supporting the strengthening of local capacity to produce and market crafts by artisans in the department.

USAID's CAPP is supporting private sector activities in cacao and passion fruit production.

### Guajira

USAID's CAPP is supporting private sector activities in crops such as passion fruit and cacao.

### Guaviare

The Government of Colombia is supporting rubber (*caucho*) production and agro forestry.

### Guainia

The Government of Colombia is providing institutional strengthening to indigenous community associations.

#### **Huila**

The ADAM program, which will begin this year, is assessing alternative development and local government strengthening activities with staff from the Department, municipalities, the private sector and beneficiaries.

USAID's Specialty Coffee project is promoting specialty coffee production, processing, and marketing in poppy-growing areas.

USAID's CAD program is supporting the production and marketing of passion fruit.

The CAPP program is supporting cacao and fruit production, while the Aid to Artisans project is promoting the production and marketing of crafts.

Democratic Local Governance Program work in Huila is focused on citizen participation, municipal management, and public information. The program has also implemented 57 social infrastructure projects that total approximately \$1,997,000.

The Government of Colombia is supporting the strengthening of cultural values in indigenous communities, fruit production, fishponds, and complementary activities for the coffee renewal program.

#### **Magdalena**

CFDP supports *Familias Guardabosques* activities in the municipality of Santa Marta totaling an estimated \$650,000. Plantation work is supported in San Angel, Algarrobo, San Sebastian, Guamal and Santa Bárbara de Pinto, totaling an estimated \$250,000.

USAID's CAPP is also providing technical and financial support in Magdalena to private sector initiatives to produce African palm, banana, cacao, and exotic fruits.

#### **Choco**

CFDP supports Afro-Colombian communities in Docampad to manage their natural forestry resources. CFDP's investment totals approximately \$180,000.

#### **Meta**

The Government of Colombia is supporting activities in cacao, cassava, buffer zones in natural parks, and technical assistance for local governments.

The USAID CAPP program is promoting private sector investments with small farmers to produce African palm.

#### **Nariño**

The ADAM program, which will begin this year, is engaged in assessing alternative development and local government strengthening activities with staff from the Department, municipalities, the private sector and beneficiaries. The program will provide support for the expansion of dairy production, processing and marketing activities that were initiated by the Land O Lakes program that recently ended.

The Specialty Coffee project is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Nariño.

CFDP supports the community council of Bajo Mira y Frontera, located in the municipality of Tumaco, in managing its natural forestry resources. CFDP has invested approximately \$400,000.

The United Nations Office on Drugs and Crime (UNODC) is implementing a USAID-funded \$1.8 million program that provides a range of agricultural and forestry projects.

In Nariño, the Democratic Local Governance Program is focused on development planning and finance and revenue, particularly in assistance to municipal administrations in the formulation of tax codes. Forty-two (42) social infrastructure projects, totaling approximately \$1,322,000, have been implemented in this department.

The USAID Dairy Promotion program is promoting sustainable small farm dairy production, processing and marketing, while the CAPP program is supporting small farmer, private sector projects in cacao and African palm production.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in Nariño.

The Government of Colombia is supporting various productive activities in coffee renewal and oil palm production.

#### **Norte de Santander**

The USAID Colombia Agribusiness Partnership Program (CAPP) program is supporting private sector initiatives with small farmers in the production and processing of African palm and cacao.



The USAID alternative development activities implemented through PAFD are working in association with ASOHESAN (the Santander rubber producer's association) to support the cultivation of 1,652 hectares of rubber that would benefit 411 families. The project also includes the establishment of 826 hectares of short-term crops and 137 food security systems (vegetable gardens, small animal husbandry).

The Government of Colombia is supporting palm oil crop production in the department.

#### **Putumayo**

The ADAM program will be supporting some activities that were developed under the Chemonics CAD project, such as hearts of palm production, processing and marketing; forest management and value added processing and utilization of forest and wood products; black pepper and plantain; tropical flowers and foliage, vanilla production, and medicinal plants and essential oils. Local government strengthening activities will also be developed with selected municipalities in Putumayo.

Democratic Local Governance Program work in Putumayo is focused on strengthening public service providers and on enhancing municipal finance and revenue capabilities. A total of 20 Social Infrastructure (SIF) projects have been implemented in this Department.

U.S. Army Corps of Engineers' \$6.7 million rural infrastructure project, funded by USAID, carried out road, sewage, and water treatment activities that generated employment in the region. Current complementary work is being carried out to improve the water treatment plant in Villa Garzon.

The Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team, is supporting indigenous communities with improved food security, health, local governance, and land management.

#### **Santander**

The ADAM program, which will begin this year, is engaged in assessing alternative development and local government strengthening activities with staff from the Department, municipalities, the private sector and beneficiaries.

#### **Tolima**

The ADAM program, which will begin this year, is assessing alternative development and local government strengthening activities with staff from the Department, municipalities, the private sector and beneficiaries.

The CAD project is supporting an activity to increase annual crop production for food security and to increase income and employment generation in the longer term through forestry, livestock, pasture improvement, and vegetable production.

The Specialty Coffee activity is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

The Colombia Enterprise Development (CED) project, funded by USAID and implemented by CARANA Corporation, is supporting small and medium enterprise development in Colombia's secondary cities including those in Tolima.

The Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in the department, while the ARD/CAPP is supporting private sector projects in fruits, natural rubber and cacao production.

Democratic Local Governance Program activities in Tolima focus on technical assistance in development planning to community leaders and public officials. In addition, the program has provided funds totaling approximately \$747,000 for 18 social infrastructure projects.

The Colombians Supporting Colombians program works in municipal development with emphasis on participatory planning. This objective is put into practice with the construction of small-scale infrastructure projects with community partnerships and mayoral involvement. The program also administers a credit fund, directly and via local microfinance institutions, to offer microenterprises credit to invest in working capital and fixed assets to enhance or expand their businesses.

The Government of Colombia is supporting cacao and coffee activities.

#### **Valle del Cauca**

The ADAM project, which is expected to begin early next year, will begin assessing potential alternative development and local government strengthening activities with the Departmental and local government authorities as well as beneficiaries.

In Valle del Cauca, the Democratic Local Governance Program has focused on technical assistance in development planning to public officials. Social infrastructure projects began April 2005.

The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute,

and peppers.

#### **Vaupes**

The Sustainable Development for Indigenous Colombian Communities project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

#### **Vichada**

The Government of Colombia is providing institutional strengthening to indigenous community associations.

#### **USAID New Programs:**

##### **MIDAS**

The new USAID initiative Mas Inversion para el Desarrollo Alternativo Sostenible (MIDAS) is a five-year, \$160 million program that has been recently awarded for implementation. MIDAS objective is to generate economic and social alternatives to illicit crop production by promoting market-driven, private sector-led business initiatives in selected "economic corridors" of Colombia, and enhance the competitiveness of the Colombian economy to meet national and international market demands, by promoting economic policy and institutional reforms. The first year work plan is being developed and implementation of activities is expected to begin around June 2006. MIDAS will provide technical and financial support to design and implement private sector alternative development initiatives in the areas of agribusinesses, commercial forestry and a wide array of rural and peri-urban activities through small and medium sized enterprises (SME). As a complement, MIDAS will support the Government of Colombia with policy reforms and institutional strengthening in the fiscal, financial, investment climate, trade and land market access areas, so as to maximize employment generation and income growth in Colombia. The "economic corridors" where MIDAS resources will be invested include the departments (states) of Antioquia, Atlántico, Bolívar, Caldas, Casanare, Cauca, Cesar, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

##### **ADAM**

The new Areas for Municipal Level Alternative Development (ADAM) program, which is beginning implementation, will be supporting alternative development and local government strengthening activities in selected municipalities by helping farmers and others involved in illicit products to shift into licit activities or remain uninvolved in illicit crop production. ADAM will support institutional strengthening activities in these municipalities on development planning, municipal management, public services, finance and revenues, citizen participation and transparency, and for social and productive infrastructure projects. Linking these local government-strengthening activities with income generating alternative development activities in a municipality is expected to increase the impact and sustainability of alternative development efforts. In Antioquia, the program will support cacao, rubber, and other alternative development activities particularly in the Bajo Cauca and northwest areas of the Department. The program also will operate in Bolivar, Cauca, Cesar, Choco, Cordoba, Huila, Narino, Putumayo, Santander, Valle del Cauca and Tolima. ADAM's first year results will be reported in next year's spray and certification report.

#### **Attachments:**

1. [Colombian Administrative Tribunal ruling of October 19, 2004, English language version](#)
2. [Government of Colombia's Ministry of Environment, Housing, and Territorial Development Ruling No. 707, July 26, 2004, English language version](#)
3. [Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia, a report prepared for the Inter-American Drug Abuse Control Commission \(CICAD\) section of the OAS, March 31, 2005](#)

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**Annex 53-F**

**DEPARTMENT OF STATE MEMORANDUM OF JUSTIFICATION CONCERNING  
THE SECRETARY OF STATE'S 2007 CERTIFICATION OF CONDITIONS RELATED  
TO AERIAL ERADICATION OF ILLICIT COCA IN COLOMBIA, 2007**

*(U.S. Department of State)*





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## Memorandum of Justification Concerning the Secretary of State's 2007 Certification of Conditions Related to the Aerial Eradication of Illicit Coca in Colombia

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**August 10, 2007**

Bureau for International Narcotics and Law Enforcement Affairs  
Washington, DC  
August 10, 2007

The Andean Counterdrug Initiative section of the Foreign Operations, Export Financing and Related Programs Appropriations Act, 2006 (P.L. 109-102) lays out conditions under which assistance using funds appropriated under the heading Andean Counterdrug Initiative may be made available for the procurement of chemicals for use in aerial eradication of illicit crops. FY 2006 conditions also apply for FY 2007 under the Revised Continuing Appropriations Resolution, 2007 (P.L. 110-5)(CR). In particular, the legislation provides:

"That not more than 20 percent of the funds appropriated by this Act that are used for the procurement of chemicals for aerial coca and poppy fumigation programs may be made available for such programs unless the Secretary of State certifies to the Committees on Appropriations that: (1) the herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws; and (2) the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species: *Provided further*, That such funds may not be made available unless the Secretary of State certifies to the Committees on Appropriations that complaints of harm to health or licit crops caused by such fumigation are evaluated and fair compensation is being paid for meritorious claims."

This memorandum provides justification for the Secretary of State's determination and certification to Congress that the above conditions have been met as required as well as a further condition imposed by the legislation: "that such funds may not be made available for such purposes unless programs are being implemented by the United States Agency for International Development, the Government of Colombia, or other organizations, in consultation with local communities, to provide alternative sources of income in areas where conditions exist for successful alternative development and where security permits for growers and communities whose illicit crops are targeted for fumigation. In 2002, 2003, 2004, and 2005 the Secretary of State determined and certified to Congress similar conditions concerning human health and environmental safety issues related to the Colombia spray program. In 2006, the Secretary of State determined and certified to Congress identical conditions concerning human health and environmental safety issues, including endemic species. These certifications were based on, among other information: all available scientific data on glyphosate, the herbicide used by the program; toxicological tests of the spray mixture (water, glyphosate, and a surfactant) as well as comparative soil and water samples before and after spray, active field verifications and complaint investigations; comprehensive human health monitoring; and thorough verbal and written consultations on the spray program with USDA and EPA. Because the Colombia aerial eradication program has not made any changes in the chemical formulation or application methods used for eradication of coca since the Secretary of State last provided certification to Congress on the Colombia spray program on August 22, 2006, these prior certifications serve as the foundation for the 2007 certification. The only change since previous certifications is that there has been no aerial eradication of illicit poppy crops since August 2006, and there are no current plans to restart aerial eradication of poppy in the coming year. These certifications and attachments can be found on the Internet at the following address: <http://www.state.gov/p/in/lr/irs/rpt/aeicc/>.

### **1. The herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws.**

EPA informed the Department of State in previous consultations that application rates for coca eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States. Since

neither the application rates used by the Colombia eradication program nor the EPA-registered label recommendations have changed since 2004, the Secretary certifies to Congress that the herbicide mixture continues to be used in accordance with EPA label requirements for comparable use in the United States.

With respect to Colombian laws, the Colombian Minister of the Environment, Housing, and Territorial Development determined in July 2004 that the illicit crop eradication program is being conducted in compliance with the Environmental Management Plan for aerial eradication (EMP). Since that determination, there have been no substantive changes in the execution of the illicit crop eradication or the EMP.

The spray program's compliance with other Colombian laws governing aerial eradication was reconfirmed by the October 19, 2004 final resolution of a class action suit filed in 2002 against the aerial eradication program on environmental and human health grounds. The Colombian Administrative Tribunal, Colombia's highest administrative court, upheld the Government of Colombia's appeal of a 2003 lower court's ruling to halt aerial eradication.

The Colombian Administrative Tribunal ruling (an English language translation of which is included as Attachment 1) concluded that:

It cannot be accurately inferred from the evidence outlined that glyphosate causes irreversible damage to the environment when it is used for eradicating illicit crops; on the other hand, a number of facts lead to the conclusion that sprayed areas regenerate in a relatively short period of time and that many hectares of forest are destroyed when trees are felled by growers of illicit crops. (p. 10)

Accordingly, the Administrative Tribunal reversed a lower court's finding, and ordered that the Ministry of the Environment, Housing and Regional Development, Ministry of Social Protection, and National Directorate of Dangerous Drugs continue their oversight of the spray program.

On February 21, 2007, the State Council upheld this decision in a ruling on a class action suit filed in May 2006 against the aerial eradication program on environmental grounds. The ruling (an English translation of which is included in Attachment 2) concluded that the aforementioned case decided in 2004 was too similar to warrant a separate decision on this case. The ruling states that:

In view of the foregoing, this Division shall declare proven the *res judicata* plea and shall reject the claims made in the suit, in view of the fact that it was not feasible for the plaintiffs to pursue a new action in order to revive petitions that have already been resolved. (p.5)

Both of these findings represent a decisive legal endorsement of the methods used for spraying illicit crops in Colombia and of the integrity of existing environmental oversight mechanisms.

**2. The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment, including endemic species.**

The Secretary of State determined and certified in 2002, 2003, 2004, 2005, and 2006 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. After previous consultations with EPA, the Department of State and the Government of Colombia have incorporated all EPA recommendations to strengthen spray program controls and ensure increased protection against adverse effects to humans and the environment. The Department of State is not aware of any published scientific evidence of risks or adverse effects to humans or the environment that have surfaced since the 2006 certification. Included below is a brief review of the conditions that allow the Secretary to recertify to Congress in 2007 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

In the 2004 EPA report, EPA offered the following assessment of human health concerns related to the spraying of coca in Colombia: "Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place." EPA also concluded "that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent." A significant number of health care providers have received training and additional training is under way or planned.

As recognized in the 2003 report, the eradication program lowered its potential risks to wildlife and has responded appropriately to minimize off-target drift. However, in the 2004 report the Agency stated, "Spray drift and potential side effect down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses." In 2003, EPA recognized that the Department of State was employing "Best Management Practices to minimize drift." The Department of State continues to follow these Best Management Practices and is ever vigilant regarding the manner in which the herbicide is applied.

In 2003, 2004, 2005 and 2006, the U.S. Narcotics Affairs Section (NAS) and the Colombia National Police (CNP) collected and analyzed a total of almost 80 water and 180 soil samples drawn from sprayed areas throughout

Colombia in order to determine the impact of glyphosate and AMPA (Amino-Methyl Phosphonic Acid) on the environment. AMPA is a product of glyphosate degradation by natural microbial and environmental activity. In accordance with the Colombian Environmental Management Plan, these samples were taken before, immediately after, and 60 days after spray in two different fields during various aerial eradication campaigns. These studies (the results of which are included as Attachment 3) determined that glyphosate and AMPA residue did not adversely impact the soil of the sprayed coca plots. Nor did the glyphosate or AMPA residue adversely impact the water taken from streams adjacent to sprayed coca crops.

In analyzing the soil and water samples, NAS and CNP (through private laboratories) use the High Pressure Liquid Chromatography (HPLC) method of analysis for glyphosate and AMPA. The HPLC standards conform to EPA standards, and this method is widely accepted as sufficiently accurate to measure and monitor the impact of glyphosate on human health and the environment.

Soil analysis reveals a 108 day half-life for glyphosate after spray application, and a maximum persistence in the environment of 217 days. This analysis does not differentiate between the glyphosate from the aerial spray program and that commonly used by coca growers. However, total residual levels in all these analyses were not found to be of environmental concern. The maximum amount of glyphosate found was close to one part per million (1 mg of glyphosate for each kilogram of dry soil).

Analysis reveals that glyphosate residue levels in water have never approached the "Maximum Contaminant Level" (MCL) as set by the US "Safe Drinking Water Act" at 700 micrograms per litre (0.7 milligrams per litre) for glyphosate residuals.

The Government of Colombia regularly conducts studies to assess the spray program's environmental impact through ground truth verifications to estimate spray drift and the accuracy of the spray mixture application, and during verification of all legitimate complaints about alleged spraying of crops or vegetation that are not coca. After one recent verification, the Government of Colombia's Ministry of Environment, Housing, and Territorial Development characterized spray drift in the following fashion:

The drift effects that were observed in areas visited on a random basis were temporary in nature and small in extent, and basically consisted of partial defoliation of the canopy of very high trees. No complementary collateral damage from spraying activities was observed at the sites selected and verified. In sprayed areas that were subsequently abandoned, it was noted that vegetation was starting to grow again, the predominant types being grasses and a number of herbaceous species (Attachment 4, p. 4)

The Department of State believes that the program's rigid controls and operational guidelines have decreased the likelihood of adverse impacts of the eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment, including endemic species.

This conclusion was confirmed by an objective, independent scientific study that evaluated the Colombia illicit crop eradication program and its potential human health and environmental considerations. The Inter-American Drug Abuse Control Commission (CICAD) of the [Organization of American States \(OAS\)](#) commissioned a two-year risk assessment of human health and environmental effects related to aerial eradication of illicit crops in Colombia. The final report to CICAD can be found at the following internet address: <http://www.cicad.oas.org/en/glyphosateFinalReport.pdf>.

In 2007, this study was peer reviewed and published in volume 190 of the scientific journal *Reviews of Environmental Contamination and Toxicology*.

This study examined not just the possible human health and environmental effects of glyphosate, but the specific manner in which glyphosate is applied in Colombia and the specific glyphosate mixture used to eradicate illicit crops, and reached the following conclusion: "(b)ased on all evidence and information presented above, the Panel concluded that the risk to humans and human health from the use of glyphosate and Cosmo-flux in the eradication of coca and poppy were minimal." (Conclusions, 6.1, p. 90). Similarly, with respect to potential risks to the Colombian environment, the panel concluded that "the risks to the environment from the use of glyphosate and Cosmo-Flux in the eradication of coca and poppy in Colombia were small in most circumstances." (Conclusions, 6.2, p. 90).

Although this conclusion broadly applies to Colombia's endemic animal species, the CICAD report noted one area of potential concern was that of the toxicity of the glyphosate mixture to Colombian amphibians. A study was therefore submitted to Congress in August 2006 ("A Preliminary Evaluation of the Risk Posed to Colombia's Amphibians and Threatened Species by the Government of Colombia's U.S.-Supported Program of Aerial Eradication of Illicit Crops") pursuant to a request in Senate Report 109-96 accompanying the Department of State, Foreign Operations, and Related Programs Appropriations Bill, 2006 (P.L. 109-102). This study concluded that worst case exposures of the mixture as used in Colombia were sufficiently toxic to the African clawed frog (which does not occur in Colombia but



which served as an indicator species because it is the amphibian most sensitive to glyphosate) to justify further studies of its toxicity to Colombian frogs. The various components of the CICAD studies are ongoing, with an expected completion date of December 2007. However, the August 2006 study noted that the worst case exposure scenario used in the study likely would be quite rare.

**3. Complaints of harm to health or licit crops caused by such fumigation are investigated, and fair compensation is being paid for meritorious claims.**

The Government of Colombia continues to compensate all meritorious claims fairly. On October 4, 2001, the GOC formally instituted a new process to compensate growers for legal crops sprayed in error. From that date through the end of May 2007, the Colombian National Police's Antinarcotics Directorate (DIRAN), the Government of Colombia agency responsible for complaint investigations, had received 6,778 such complaints. Of these, 6,344 investigations were completed as of May 31, 2007.

Complaints are processed and verified by an interagency group including the DIRAN, agronomists from the Colombian Institute of Agriculture and Husbandry (ICA), the Ministry of Environment, and the Office of Dangerous Drugs (DNE). In 2006, 7 complaints were found to be valid and payments were made, for a total of \$21,300 as compensation. From January through May 2007, nine complaints have been compensated for a total of \$39,000. To date, the spray program has compensated a total of 43 cases, amounting to approximately \$195,000 in compensation. The 431 outstanding complaints (as of June 2007) are being processed and verified by the interagency complaints investigations group. Flight database and on-site investigations continue. Typically, compensation hinges on very basic issues, such as whether planes sprayed in the vicinity of the complainant's property within a five-day window of the alleged date of spraying; whether the complainant owns the allegedly sprayed property; whether the legal crop sprayed was intermixed with illegal crops; and whether the affected crop suffered damage from the spray mixture, as opposed to fungus, insects, or other causes. If the spray pilots have erred and accidentally sprayed licit crops, compensation is paid to the farmer for the loss of the crop, based on current market value of, and the start-up investment in, the crop.

Field verification is extremely dangerous and resource intensive; and it is an unavoidably methodical process. Because of the high risks involved for all personnel who conduct site visits, the primacy of security will dictate the pace of investigations. Although logistical considerations (security concerns, personnel availability, and helicopter resources) are part of the reason why complaints cannot be resolved in the field more quickly, the greatest contributor to the backlog of cases is the number of false complaints which slow the progress of field investigators. For example, in May 2006, the complaints investigations group spent three days conducting field verification of some 75 cases alleging sprayed African palm near Tumaco, Nariño. The eradication program spent over \$100,000 in helicopter flight hours alone investigating these claims and found that in every case coca was interspersed with the palm.

The Government of Colombia has recently approved a new resolution suggested by the Department of State to streamline the administration of the complaints process. We also plan to contribute to the improvement of the complaints resolution process through aircraft mounted imagery platforms to make in situ verification safer, cheaper, and faster. The Government of Colombia has begun to seize property used for growing illicit crops, although security-related and bureaucratic hurdles are significant. We expect this will reduce the number of false claims that have flooded the complaint system, thereby facilitating more prompt investigation of, and restitution for, legitimate claims.

**4. Programs are being implemented by the USAID, the GOC, or other organizations in consultation with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers whose illicit crops are targeted for spraying.**

Thus far in calendar year 2007, the Colombian aerial eradication program has sprayed (or anticipates spraying) coca in the departments of Putumayo, Nariño, Guaviare, Meta, Bolivar, Cauca, Norte de Santander, Vichada, Antioquia, Vaupes, Cordoba, Caldas, Arauca, Cesar, Valle del Cauca, and La Guajira. In each of these areas, USAID, the GOC, and/or other organizations are implementing alternative development programs to provide legal income generating opportunities to small farm families who agree to accept benefits after verification by GOC and USAID implementing partners that the farms are free of illicit crops.

For the purposes of this report, the Department of State interprets the term "area" as a Colombian department. This is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components cannot always be co-implemented in every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca is often cultivated in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than illegal crops. Dispersing development activities to remote areas often raises costs and security risks, while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils,

inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of the 2005 Consolidated Appropriations Act, narco-terrorist and paramilitary groups operate in many illicit crop-growing zones and make the presence of alternative development projects inadvisable in such locations. These narco-terrorist groups reap immense profit from the illegal trade, pose grave security risks for development personnel, and slow down project implementation.

Despite these obstacles to alternative development in Colombia, USAID and the GOC are moving forward with a robust alternative development program in coca and opium producing areas. Now in the sixth year of Plan Colombia alternative development coordination with the GOC and the fifth year of project implementation, USAID's alternative development program has supported a total of 105,133 hectares of licit crops, 168,627 hectares of forest land, and completed 1,130 infrastructure projects in coca growing areas through December 31, 2006. These efforts have benefited 83,587 families. Equally important, USAID has strengthened a total of 2,502 small, medium or large private sector enterprises so that alternative development and community building activities will be more sustainable.

#### **USAID New Programs:**

##### **MIDAS**

The new USAID initiative Increased Investment for Sustainable Alternative Development (MIDAS) is a five-year, \$180 million program. MIDAS' objective is to generate economic and social alternatives to illicit crop production by promoting market-driven, private sector-led business initiatives in selected "economic corridors" of Colombia, and enhance the competitiveness of the Colombian economy to meet national and international market demands, by promoting economic policy and institutional reforms. Implementation began during 2006. MIDAS will provide technical and financial support to design and implement private sector alternative development initiatives in the areas of agribusinesses, commercial forestry and a wide array of rural and peri-urban activities through small and medium sized enterprises (SME). As a complement, MIDAS will support the Government of Colombia with policy reforms and institutional strengthening in fiscal, financial, investment climate, trade, and land market access areas so as to maximize employment generation and income growth in Colombia. The "economic corridors" where MIDAS resources will be invested include the departments (states) of Antioquia, Atlántico, Bolívar, Caldas, Casanare, Cauca, César, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

##### **ADAM**

The new Alternative Development at the Municipal Level program (ADAM), which began implementation during 2006, is supporting alternative development and local government strengthening activities in selected municipalities by helping farmers and others involved in illicit products to shift into licit activities or remain uninvolved in illicit crop production. ADAM will support institutional strengthening activities in these municipalities on development planning, municipal management, public services, finance and revenues, citizen participation and transparency, and for social and productive infrastructure projects. Linking these local government strengthening activities with income generating alternative development activities in a municipality is expected to increase the impact and sustainability of alternative development efforts. In Antioquia, the program will support cacao, rubber, and other alternative development activities particularly in the Bajo Cauca and northwest areas of the Department. The program also will operate in Bolivar, Cauca, Cesar, Choco, Cordoba, Huila, Narino, Putumayo, Santander, Valle del Cauca and Tolima. ADAM's first year results will be reported in next year's spray certification report.

##### **Antioquia**

An \$18.5 million USAID project directed at alternative development, implemented by the Pan-American Development Foundation (PADF) supports short-term production activities for immediate income and employment needs. It also seeks to establish longer-term crops such as natural rubber (caucho) and cacao to provide sustainability, as well as complementary productive infrastructure. Projects of cacao, rubber, and agro forestry would cover over 2,000 hectares and benefit over 600 families in El Bajo Cauca.

An \$8.5 million USAID dairy project was carried out by Land O'Lakes (LOL) to promote sustainable dairy production, processing and marketing involving small farmers. This program closed out in March 2006, but some activities are being continued by the USAID funded ADAM program. This program is also operated in Nariño.

USAID also funds an activity titled Aid to Artisans (ATA), which is carrying out a \$4.3 million project to strengthen local capacity for production and marketing of crafts. ATA is operating in Atlántico, Boyacá, Caldas, Cauca, César, Córdoba, Huila, Magdalena, Nariño, Quindío, Santander, Sucre, Tolima, and Valle del Cauca.

USAID's successful \$41.5 million Colombia Agribusiness Partnership Program (CAPP), implemented by Associates in Rural Development (ARD), was merged into the Increased Investment for Sustainable Alternative Development Program (MIDAS) during June 2006 and continues to promote private sector involvement to help agricultural producers and others involved in illicit products to shift into legal activities or remain uninvolved in illicit coca production. The

project targets rural families in coca regions and threatened zones and assists them by supporting strategic alliances between agribusiness firms and these families. In Antioquia, the program supports small farmers in producing fruit for processing into pulp, jute and African palm. The program also operates in Atlántico, Bolívar, Caldas, Casanare, Cauca, César, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca.

The USAID-funded Democratic Local Governance Program implemented by Associates in Rural Development (ARD) closed out in February 2006, but the activities it supported - municipal-level development planning, municipal management, public services, finance and revenue, public information, and project management - continue to be implemented by the Alternative Development at the Municipal Level (ADAM) and ARD.

The \$18.6 million Colombia Forestry Development Program (CFDP), funded directly by USAID and implemented by Chemonics, promoted pine plantations and efficient industrial processing models in Northeastern Antioquia. This program closed out in August 2006 and activities are being continued by the MIDAS program.

USAID's \$12 million Colombia Enterprise Development (CED) project supported small and medium enterprise development in secondary cities in Antioquia. CED also operated in Atlántico, Caldas, Quindío, Risaralda, Santander, Valle del Cauca, and Tolima. This program closed out in August 2006 and activities are being continued by the MIDAS program.

The Colombian Government's USD \$19.4 million Investment Fund for Peace (IFP) is generating employment through infrastructure, licit crop production (coffee rehabilitation, agro forestry), skills training, and education/nutrition aid to poor families.

### **Bolivar**

The previously mentioned ADAM program is supporting cacao alternative development along with municipal strengthening activities in selected municipalities.

CFDP supported plantation efforts totaling an estimated \$400,000 in Bolivar in the following municipalities: Zambrano, Fundación, Sabanas de San Angel, Becerril and Agustin Codazzi.

USAID's alternative development program carried out by PADF is supporting short cycle production activities to address immediate income and employment requirements; longer-term crops such as natural rubber and cacao to provide sustainability; and complementary productive infrastructure. The project supports 2450 hectares of licit crops benefiting 661 families.

USAID's CAPP (now MIDAS) is also promoting private sector involvement with farmers to produce cacao, African palm, and yucca (cassava).

In Bolivar, the Democratic Local Governance Program strengthened nine municipal administrations in southern Bolivar in the areas of transparency and accountability (TA). The municipalities of Santa Rosa and Simití are the main beneficiaries of the provided technical assistance package, but seven other municipalities also received punctual and specific TA training. In total, the program invested USAID funds of \$624,589 in social infrastructure projects and leveraged a counterpart contribution of up to 53 percent of the total cost. This program closed out and this region will be included under the new ADAM program.

The GOC is active in Bolivar supporting licit production activities such as palm oil and cassava production.

### **Caquetá**

USAID's centerpiece Colombia Alternative Development (CAD), implemented by Chemonics, was a \$97.3 million project; in Caquetá it fostered short-term crop production for food security and long-term income generation activities such as rubber production. This program closed out in May 2006.

The Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team (ACT), assisted Colombian indigenous communities in food security, health, local governance, and land management. Activities under this program are also being carried out in the departments of Putumayo and Vaupés. The GOC is also supporting institutional strengthening for small-scale brown sugar producers and life plans for indigenous communities.

### **Cauca**

CFDP started supporting Afro-Colombian communities in Guapi to manage their natural forestry resources. Technical assistance is also provided to communities in Timbiquí. The CFDP closed out in August 2006 and the MIDAS programs continued to support these communities.

USAID Alternative Development activities also include a \$9.8 million project, implemented by ACDI/VOCA, which promotes specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The CAPP (Now MIDAS) project supported private sector investments in hot peppers, jute, and cacao.

USAID Democratic Local Governance Program efforts in Cauca have focused mainly on working with community leaders and public officials to improve municipal management practices. The program also funded the implementation of 64 social infrastructure projects totaling approximately \$2,288,630 and leveraged 41% of the total costs. This program closed out in February 2006 and ADAM will continue this type of activity in Cauca.

USAID's Aid to Artisans project is enhancing local capacity for production and marketing of crafts as licit income generating alternatives.

The Colombians Supporting Colombians Program works in municipal development with emphasis on participatory planning. This is put into practice with the construction of small-scale infrastructure projects with community partnership and mayoral involvement. The program also administers a credit fund, directly and via local microfinance institutions, to offer micro-credit for working capital and fixed assets to enhance or expand small businesses.

The GOC is supporting fruit production and complementary activities for the coffee renewal program.

#### **Caldas**

USAID's Specialty Coffee program is also promoting specialty coffee production, processing, and marketing in Caldas's illicit crop growing areas. The CAPP activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

#### **César**

The ADAM program will be carrying out alternative development and municipal strengthening activities in selected municipalities. The Aid to Artisans project is carrying out activities to strengthen the production and marketing of crafts. The CAPP (now MIDAS) is supporting private sector investments for small farmers producing crops such as cacao, fruits and African palm. The GOC is also supporting cacao and oil palm production in this region.

#### **Choco**

CFDP supports Afro-Colombian communities in Docampadó to manage their natural forestry resources. CFDP's investment totals approximately \$180,000.

#### **Guajira**

USAID's CAPP (now MIDAS) is supporting private sector activities in crops such as passion fruit and cacao.

#### **Guainia**

The GOC is providing institutional strengthening to indigenous community associations.

#### **Guaviare**

The GOC is supporting rubber production and agro forestry.

#### **Huila**

The ADAM program is supporting Passion Fruit and Blackberry production and local government strengthening activities with staff from the Department and the municipalities.

USAID's Specialty Coffee project is promoting specialty coffee production, processing, and marketing in poppy growing areas.

The CAPP (now MIDAS) program is supporting cacao and fruit production, while the Aid to Artisans project is promoting the production and marketing of crafts.

Democratic Local Governance Program work in Huila is focused on citizen participation, municipal management, and public information. The program has also implemented 57 social infrastructure projects that total approximately \$1,997,000. This program closed out in February 2006 and LG activities are being continued by the ADAM program.

The GOC is supporting the strengthening of cultural values in indigenous communities, fruit production, fishponds, and complementary activities for the coffee renewal program.

#### **Magdalena**

CFDP supports *Familias Guardabosques* activities in the municipality of Santa Marta totaling an estimated \$650,000. Plantation work is supported in San Angel, Algarrobo, San Sebastian, Guamal and Santa Bárbara de Pinto, totaling an estimated \$250,000.

USAID's CAPP is also providing technical and financial support in Magdalena to private sector initiatives to produce African palm, banana, cacao, and exotic fruits.

#### **Meta**

The GOC is supporting activities in cacao, cassava, buffer zones in natural parks, and technical assistance for local governments.

The USAID CAPP (now MIDAS) program is promoting private sector investments with small farmers to produce African palm.

#### **Nariño**

The ADAM program is supporting milk production activity and local government strengthening activities with staff from the Department and municipalities.

The Specialty Coffee project is promoting specialty coffee production, processing, and marketing in illicit crop growing areas of Nariño.

CFDP supported the community council of Bajo Mira y Frontera, located in the municipality of Tumaco, in managing its natural forestry resources. CFDP invested approximately \$400,000. The MIDAS program now supports this activity.

The United Nations Office on Drugs and Crime (UNODC) implemented a USAID-funded \$1.8 million program that provides a range of agricultural and forestry projects.

The CAPP (now MIDAS) program is supporting small farmer, private sector projects in cacao and African palm production.

Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in Nariño.

The GOC is supporting various productive activities in coffee renewal and oil palm production.

#### **Norte de Santander**

The CAPP (now MIDAS) program is supporting private sector initiatives with small farmers in the production and processing of African palm and cacao.

The USAID alternative development activities implemented through PAFD are working in association with ASOHESAN (the Santander rubber producer's association).

The GOC is supporting palm oil crop production in the department.

#### **Putumayo**

The ADAM program is supporting hearts of palm, vanilla and pepper production activities that were developed under the Chemonics CAD.

U.S. Army Corps of Engineers' \$6.7 million rural infrastructure project, funded by USAID, carried out road, sewage, and water treatment activities that generated employment in the region. Current complementary work to improve the water treatment plant in Villa Garzon was concluded in December 2006.

The Sustainable Development for Indigenous Colombian Communities project, implemented by the Amazon Conservation Team, is supporting indigenous communities with improved food security, health, local governance, and land management.

#### **Santander**

The ADAM program is supporting cattle and cacao activities and local government strengthening activities with staff from the Department and municipalities.

#### **Tolima**

The ADAM program is assessing alternative development and local government strengthening activities with staff from the Department, municipalities, the private sector and beneficiaries which will begin this year.

The Specialty Coffee activity is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

The Colombia Enterprise Development (CED) project, funded by USAID and implemented by CARANA Corporation, supported small and medium enterprise development in Colombia's secondary cities including those in Tolima. This program closed out in August 2006.

The Aid to Artisans project is carrying out activities to promote the production and marketing of crafts in the department, while the ARD/CAPP (now MIDAS) is supporting private sector projects in fruits, natural rubber and cacao production.

Democratic Local Governance Program activities in Tolima focus on technical assistance in development planning to community leaders and public officials. In addition, the program has provided funds totaling approximately \$747,000 for 18 social infrastructure projects. This program closed out in February 2006.

The Colombians Supporting Colombians Program works in municipal development with emphasis on participatory planning, and also administers a credit fund as described above in Cauca Department.

The GOC is supporting cacao and coffee activities.

#### **Valle del Cauca**

The ADAM project will begin assessing potential alternative development and local government strengthening activities with the Departmental and local government authorities as well as beneficiaries which are expected to begin early next year.

In Valle del Cauca, the Democratic Local Governance Program has focused on technical assistance in development planning to public officials. This program closed out in February 2006.

The CAPP (now MIDAS) activity is supporting private sector initiatives with small farmers to produce and process tropical fruits, jute, and peppers.

#### **Vaupes**

The Sustainable Development for Indigenous Colombian Communities project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

#### **Vichada**

The GOC is providing institutional strengthening to indigenous community associations.

The preceding four sections and attachments form the basis of the Justification for the Secretary of State's 2006 Certification of Conditions Related to the Aerial Eradication of Illicit Coca in Colombia.

#### **Attachments [not available online]:**

1. Colombian Administrative Tribunal ruling of October 19, 2004, English language version
2. Colombian State Council ruling of February 21, 2007, English language version
3. Results of Aerial Eradication Program Soil and Water Sampling
4. Government of Colombia's Ministry of Environment, Housing, and Territorial Development Ruling No. 707, July 26, 2004, English language version
5. Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia, a report prepared for the Inter-American Drug Abuse Control Commission (CICAD) section of the OAS, March 31, 2005

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**Annex 53-G**

**DEPARTMENT OF STATE MEMORANDUM OF JUSTIFICATION CONCERNING THE  
SECRETARY OF STATE'S 2008 CERTIFICATION OF CONDITIONS RELATED TO  
AERIAL ERADICATION OF ILLICIT COCA IN COLOMBIA, 2008**

*(U.S. Department of State)*





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**Memorandum of Justification Concerning  
the Secretary of State's 2008 Certification of Conditions  
Related to the Aerial Eradication of Illicit Coca in Colombia**

The Department of State, Foreign Operations and Related Programs Appropriations Act (SFOAA), 2008 (Division J, P.L. 110-161) establishes certain conditions under which assistance using funds appropriated under the heading Andean Counterdrug Programs may be made available for the procurement of chemicals for use in the aerial eradication of illicit crops. In particular, the act provides:

Provided further, That of the funds available for the Colombian national police for the procurement of chemicals for aerial coca and poppy eradication programs, not more than 20 percent of such funds may be made available for such eradication programs unless the Secretary of State certifies to the Committees on Appropriations that: (1) the herbicide is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws; and (2) the herbicide, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species: Provided further, That such funds may not be made available unless the Secretary of State certifies to the Committees on Appropriations that complaints of harm to health or licit crops caused by such aerial eradication are thoroughly evaluated and fair compensation is being paid in a timely manner for meritorious claims: Provided further, That the Secretary shall submit a report to the Committees on Appropriations detailing all claims, evaluations, and compensation paid during the twelve month period prior to the date of enactment of this Act: Provided further, That such funds may not be made available for such purposes unless programs are being implemented by United States Agency for International Development, the GOC, or other organizations, in consultation and coordination with local communities, to provide alternative sources of income in areas where security permits for small-acreage growers and communities whose illicit crops are targeted for aerial eradication:

This memorandum provides justification for the Secretary of State's determination and certification to Congress that the above conditions have been met as required. In 2002, 2003, 2004, 2005, 2006, and 2007 the Secretary of State determined and certified to Congress on several similar conditions concerning human health and environmental safety issues related to the Colombia spray

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program. The earlier certifications were based on, among other information: all available scientific data on glyphosate, the herbicide used by the program; toxicological tests of the spray mixture (water, glyphosate, and a surfactant) as well as comparative soil and water samples before and after spray; active field verifications and complaint investigations; comprehensive human health monitoring; and thorough verbal and written consultations on the spray program with the U.S. Department of Agriculture (USDA) and the Environmental Protection Agency (EPA).

Because the Colombia aerial eradication program has not made any changes in the chemical formulation or application methods used for eradication of coca since the Secretary of State last provided certification to Congress on the Colombia spray program on August 9, 2007, these prior certifications serve as the foundation for this certification and can be found at: <http://www.state.gov/p/inl/rls/rpt/aeicc/>.

The FY 2008 SFOAA established an additional requirement for reporting information on claims, evaluations and compensation paid during the twelve month period prior to the date of enactment, which is included under Section (3) of this Memorandum of Justification.

As noted in the 2007 certification, poppy crops have been eradicated only manually since August 2006, and there are no current plans to restart aerial eradication of poppy in the coming year.

**1. The herbicide mixture is being used in accordance with EPA label requirements for comparable use in the United States and with Colombian laws.**

EPA informed the Department of State in previous consultations that application rates for coca eradication in Colombia are within the parameters listed on labels of glyphosate products registered by EPA for use in the United States. Since neither the application rates used by the Colombia eradication program nor the EPA-registered label recommendations have changed since 2004, the Secretary can again certify to Congress that the herbicide mixture continues to be used in accordance with EPA label requirements for comparable use in the United States.

With respect to Colombian laws, the Colombian Minister of the Environment, Housing, and Territorial Development determined in July 2004 that the illicit crop eradication program is being conducted in compliance with the Environmental Management Plan (EMP) for aerial eradication. Since that

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determination, there have been no substantive changes in the execution of the illicit crop eradication or the EMP.

The spray program's compliance with other Colombian laws governing aerial eradication was reconfirmed by the October 19, 2004 final resolution of a class action suit filed in 2002 against the aerial eradication program on environmental and human health grounds. The Colombian Administrative Tribunal, Colombia's highest administrative court, upheld the GOC's appeal of a 2003 lower court's ruling to halt aerial eradication.

The Colombian Administrative Tribunal ruling (an English language translation of which is included as Attachment 1) concluded that:

"It cannot be accurately inferred from the evidence outlined that glyphosate causes irreversible damage to the environment when it is used for eradicating illicit crops; on the other hand, a number of facts lead to the conclusion that sprayed areas regenerate in a relatively short period of time and that many hectares of forest are destroyed when trees are felled by growers of illicit crops." (p. 10)

Accordingly, the Administrative Tribunal reversed a lower court's finding, and ordered that the Ministry of the Environment, Housing and Regional Development, Ministry of Social Protection, and National Directorate of Dangerous Drugs continue their oversight of the spray program.

On February 21, 2007, the State Council upheld this decision in a ruling on a class action suit filed in May 2006 against the aerial eradication program on environmental grounds. The ruling (an English translation of which is included in Attachment 2) concluded that the aforementioned case decided in 2004 was too similar to warrant a separate decision on this case. The ruling states that:

"In view of the foregoing, this Division shall declare proven the *res judicata* plea and shall reject the claims made in the suit, in view of the fact that it was not feasible for the plaintiffs to pursue a new action in order to revive petitions that have already been resolved." (p.5)

Both of these findings represent a clear legal endorsement of the methods used for spraying illicit crops in Colombia and of the integrity of existing environmental oversight mechanisms.

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**2. The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species.**

The Secretary of State determined and certified in 2002, 2003, 2004, 2005, and 2006 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment. In 2007, the Secretary of State determined and certified that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment, including endemic species. After previous consultations with EPA, the Department of State and the GOC (GOC) have incorporated all EPA recommendations to strengthen spray program controls and ensure increased protection against adverse effects to humans and the environment. The Department of State is not aware of any new evidence of risks or adverse effects to humans or the environment that have surfaced since the 2007 certification. Included below is a brief review of the conditions that allow the Secretary to again certify to Congress in 2008 that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment, including endemic species.

In its 2004 report, the EPA offered the following assessment of human health concerns related to the spraying of coca in Colombia: "Despite an aggressive search for cases, there does not appear to be any evidence that glyphosate aerial spraying has resulted in any adverse health effects among the population where this spraying takes place." The EPA also concluded "that an aggressive program to identify glyphosate poisoning has been implemented in the areas of Colombia where illicit crop eradication spraying programs are prevalent."

As recognized in the 2003 report, the eradication program lowered its potential risks to wildlife and has responded appropriately to minimize off-target drift. However, in the 2004 report the Agency stated, "Spray drift and potential side effect down wind of the target sites are common, universal factors in most if not all pesticide applications from aerial or ground applications for all uses." In 2003, EPA recognized that the Department of State was employing "best management practices to minimize drift." The Department of State continues to follow these best management practices and remains vigilant regarding the manner in which the herbicide is applied.

From 2003 through 2008, the Narcotics Affairs Section (NAS) of the U.S. Embassy and the Colombia National Police (CNP) collected and analyzed a total

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of almost 85 water and 195 soil samples drawn from sprayed areas throughout Colombia in order to determine the impact of glyphosate and AMPA (Amino-Methyl Phosphonic Acid) on the environment. AMPA is a product of glyphosate degradation by natural microbial and environmental activity. In accordance with Colombia's Environmental Management Plan (EMP), these samples were taken before, immediately after, and 60 days after spray in two different fields during various aerial eradication campaigns.

These studies (the results of which are included as Attachment 3) determined that glyphosate and AMPA residue did not adversely impact the soil of the sprayed coca plots, nor did the glyphosate or AMPA residue adversely impact the water taken from streams adjacent to sprayed coca crops.

In analyzing the soil and water samples, NAS and CNP (through private laboratories) use the High Pressure Liquid Chromatography (HPLC) method of analysis for glyphosate and AMPA. The HPLC standards conform to EPA standards, and this method is widely accepted as sufficiently accurate to measure and monitor the impact of glyphosate on human health and the environment.

Soil analysis shows a 108 day half-life for glyphosate after spray application, and a maximum persistence in the environment for 217 days. This analysis does not differentiate between the glyphosate from the aerial spray program and that commonly used by coca growers. However, total residual levels in all these analyses were not found to be of environmental concern. The maximum amount of glyphosate found was close to one part per million (1 mg of glyphosate for each kilogram of dry soil).

Analysis also establishes that glyphosate residue levels in water have never approached the "Maximum Contaminant Level" (MCL), as set by the U.S. "Safe Drinking Water Act" at 700 ug/L micrograms per litre (0.7mg/L milligrams per litre) for glyphosate residuals.

The GOC regularly conducts studies to assess the spray program's environmental impact through ground truth verifications to estimate spray drift and the accuracy of the spray mixture application, and during verification of all legitimate complaints about alleged spraying of crops or vegetation that are not coca. After one such verification in 2007, the GOC's Ministry of Environment, Housing, and Territorial Development characterized spray drift in the following fashion:

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“The drift effects that were observed in areas visited on a random basis were temporary in nature and small in extent, and basically consisted of partial defoliation of the canopy of very high trees. No complementary collateral damage from spraying activities was observed at the sites selected and verified. In sprayed areas that were subsequently abandoned, it was noted that vegetation was starting to grow again, the predominant types being grasses and a number of herbaceous species.” (Attachment 4, p. 4)

When a health complaint relating to the spray program is received, medical personnel from the Colombian National Institute of Health (INS) are sent to the location where a medical exam is conducted and body fluid samples are collected and sent to a laboratory in a nearby Latin American country for analysis. The U.S. Embassy is working closely with INS to develop a laboratory that is capable of analyzing these samples in Colombia, in order to speed up the processing time. Since the inception of the complaints program, the medical examinations and sample analysis results have never resulted in any verified cases of human health damage due to aerial spraying of coca or poppy, although all claims have been thoroughly investigated. Additional information on health concerns is provided under section 3 of this Memorandum of Justification.

The Department of State believes that the program’s rigid controls and operational guidelines have decreased the likelihood of adverse impacts of the eradication program on humans and the environment and that the herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment.

This conclusion was confirmed by an objective, independent scientific study that evaluated the Colombia illicit crop eradication program and its potential human health and environmental considerations. The Inter-American Drug Abuse Control Commission (CICAD) of the Organization of American States (OAS) commissioned a two-year risk assessment of human health and environmental effects related to aerial eradication of illicit crops in Colombia. The final report to CICAD can be found at: <http://www.cicad.oas.org/en/glifosateFinalReport.pdf>. In 2007, that study was peer reviewed and published in volume 190 of the Reviews of Environmental Contamination and Toxicology.

The CICAD study examined not just the possible human health and environmental effects of glyphosate, but the specific manner in which glyphosate is applied in Colombia and the specific glyphosate mixture used to eradicate illicit

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crops, and reached the following conclusion: “(b)ased on all evidence and information presented above, the Panel concluded that the risk to humans and human health from the use of glyphosate and Cosmo-flux in the eradication of coca and poppy were minimal.” (Conclusions, 6.1, p. 90). Similarly, with respect to potential risks to the Colombian environment, the panel concluded that “the risks to the environment from the use of glyphosate and Cosmo-Flux in the eradication of coca and poppy in Colombia were small in most circumstances.” (Conclusions, 6.2, p. 90).

Although this conclusion also broadly applies to Colombia’s endemic animal species, the CICAD report noted one area of potential concern was that of the toxicity of the glyphosate mixture to Colombian amphibians. A study was therefore submitted to Congress in August 2006 (“A Preliminary Evaluation of the Risk Posed to Colombia’s Amphibians and Threatened Species by the GOC’s U.S.-Supported Program of Aerial Eradication of Illicit Crops”) pursuant to a request in Senate Report 109-96 accompanying the Foreign Operations, Export Financing and Related Programs Appropriations Act, 2006 (P.L. 109-102). This study concluded that worst case exposures of the mixture as used in Colombia were sufficiently toxic to the African clawed frog (which does not occur in Colombia but which served as an indicator species because it is the amphibian most sensitive to glyphosate) to justify further studies of its toxicity to Colombian frogs. The various components of the CICAD studies are ongoing. However, the August 2006 study noted that the worst case exposure scenario used in the study likely would be quite rare.

**3. Complaints of harm to health or licit crops caused by such aerial eradication are thoroughly evaluated, and fair compensation is being paid in a timely manner for meritorious claims.**

The GOC continues to investigate and compensate all meritorious claims fairly. On October 4, 2001, the GOC formally instituted a strengthened process to compensate growers for legal crops sprayed in error. All complaints are processed and verified by an interagency group, including the Colombian National Police’s Antinarcotics Directorate (DIRAN), agronomists from the Colombian Institute of Agriculture and Husbandry (ICA), the Ministry of Environment, and the Office of Dangerous Drugs (DNE).

In most cases, compensation hinges on very basic issues, such as whether planes sprayed in the vicinity of the complainant’s property within a five-day window of the alleged date of spraying; whether the complainant owns the

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allegedly sprayed property; whether the legal crop sprayed was intermixed with illegal crops; and whether the affected crop suffered damage from the spray mixture, as opposed to fungus, insects, or other causes. If the spray pilots have erred and accidentally sprayed licit crops, compensation is paid to the farmer for the loss of the crop, based on current market value of the crop.

As provided for in the FY 2008 SFOAA, this memorandum also includes information detailing claims, their evaluation and compensation paid. It covers a longer period than that asked by the legislation, a period of one year prior to enactment (i.e. December 2006 through December 2007), as the Colombian authorities responsible for his process were able to make more information available.

- From 2001 through the end of May 2008, DIRAN, the GOC agency responsible for complaint investigations, received 8,050 such complaints. Of these, 7,037 investigations were completed as of May 31, 2008; and the spray program has compensated a total of 89 cases, amounting to approximately \$474,294 in compensation.
- From May 2007 through May 2008 DIRAN received 1,315 new complaints. Fifty were compensated totaling approximately \$252,172 USD.
- Out of the 1,315 new complaints, two-hundred and eighty-seven complainants submitted incomplete information, and their cases were dismissed, while it was determined that in 459 cases, either spray operations did not occur, or illicit crops were mixed with legal crops.

While a large number of complaints claiming crop damage are submitted, the majority are not compensated due to coca being intermixed with legal crops. Out of the 8,050 (1,013 of which were active as of May 31st) complaints received, approximately 28% have been dismissed due to incomplete information, and in 58% of the cases it was determined that legal crops were illegally interspersed with illicit crops.

Every effort is made to increase knowledge on the compensation process, decrease the number of incomplete applications, and increase transparency of verification missions. For example, training sessions are held with local mayors to teach them how to file a complaint, and explain what information is required. Additionally, it is explained that if, in reviewing submissions, it is determined

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that additional information is needed, it is imperative to send the missing information in order to continue processing the case.

Outstanding complaints are processed and verified by the Colombian Government's interagency complaints investigations group as rapidly as possible. Flight database and on-site investigations continue, and compensation is being paid for all cases with merit after analysis of all considerations.

A significant constraint on this process is that field verifications are extremely dangerous and resource intensive; and it is an unavoidably methodical process. Security requirements dictate the pace of investigations, because of the high risks involved for all personnel who conduct site visits.

In addition to security concerns, logistical considerations (personnel availability and helicopter resources) also explain why complaints can take time to be resolved. However, the most important reason for delays in the complaint system is the number of invalid complaints which handicap the ability of field investigators to close cases more quickly. For example, in May 2006, the complaints investigations group spent three days investigating some 75 complaints that program pilots had sprayed African palm near Tumaco, Nariño. The eradication program spent over \$100,000 in helicopter flight hours alone investigating these claims and found that in every case illicit coca was interspersed with the palm.

Although illegal armed groups such as the Revolutionary Armed Forces of Colombia (FARC) may not be responsible for all of the false complaints slowing the process, there is no question that they encourage the submission of complaints. In fact, the GOC has found the complaint forms on a number of computers seized from the FARC. The FARC is designated as a Foreign Terrorist Organization (FTO) by the USG.

In 2007, the GOC approved a resolution to streamline the reception and administration of the complaints process. The complaints resolutions process has also been improved by using aircraft mounted imagery platforms to make *in situ* verification safer, less expensive, and faster.

Also in 2007, the GOC began processes for seizure and forfeiture of property used for growing illicit crops, although security-related and bureaucratic hurdles are significant. GOC improvements in the area of asset forfeiture are anticipated to reduce the many false claims that have flooded the complaint

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system, and facilitate even more prompt investigation of, and restitution for, legitimate claims.

Each health complaint is thoroughly investigated by a licensed health official. Complaints are submitted to the local health authorities in the city where the alleged intoxication occurred. The local doctor performs a medical examination and sends a report detailing his findings to the National Institute of Health (INS) in Bogota, explaining the patient's medical condition and when and where spray allegedly occurred. The antinarcotics police will either confirm or deny that spray operations took place in the specified area on the stated date. If spray operations are confirmed and it is believed that the patient's health problem could be the result of exposure to aerial spray, INS will dispatch a doctor to analyze the case's details and collect blood and urine samples for analysis.

In emergency situations, an INS doctor is immediately sent to the location upon hearing of a possible health complaint. He or she will perform the medical examination and collect body fluid samples. This situation has only occurred twice. In September of 2007, a community in the city of Putumayo reported that 18 adults and 5 children were experiencing headaches, abdominal pain, and vomiting due to spray. It was determined that 13 of these people could have been exhibiting signs of a chemical reaction. Upon completion of the medical exam, samples were sent to an international laboratory in a nearby Latin American country, where it was determined that the body fluid samples did not contain traces of glyphosate. The second case claimed that a child passed away in Nariño in March 2008. It was determined that the child's death was the result of a respiratory infection. Additionally, spray operations did not occur in this location at the time of the alleged spraying. The INS received 14 complaints between May 2007 and May 2008. In each of the ten closed cases, it was established that chemical exposure as a result of the aerial eradication program did not cause the health problem. The remaining four cases are more recent and are still being investigated. As stated, earlier, since the beginning of the complaints program, there has never been a single health complaint that could be scientifically substantiated as related to aerial spray activities.

**4. Programs are being implemented by the USAID, the Government of Colombia or other organizations in consultation and coordination with local communities, to provide alternative sources of income in areas where security**

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**permits for small-acreage growers and communities whose illicit crops are targeted for aerial eradication.**

In calendar year 2008, the GOC's aerial eradication program has sprayed -- or anticipates spraying -- coca in the departments of Antioquia, Arauca, Bolivar, Boyacá, Caldas, Caquetá, Cauca, Cesar, Cordoba, Guaviare, Huila, Magdalena, Meta, Nariño, Norte de Santander, Putumayo, Santander, Tolima, Vaupes, and Vichada. In each of these areas, USAID, the GOC, and/or other organizations are implementing alternative development programs in consultation and coordination with local communities to provide legal income generating opportunities to small farm families who agree to accept benefits after verification by the GOC and USAID implementing partners that their properties are free of illicit crops.

For the purposes of this report, the Department of State interprets the term "area" as a Colombian department. This is consistent with the way that the Colombian spray program records and reports spray activity. It is also the most appropriate definition because Department of State and USAID experience has shown that while alternative development programs should be (and are) coordinated with spraying, these two components cannot always be co-implemented at every location.

Alternative development is not appropriate in many locations where illicit crops are grown. Coca is often cultivated far from markets, in remote, difficult to reach areas with limited infrastructure to support legal crops that have less value and higher transport costs than those for illegal merchandise. Dispersing development activities to remote areas often raises costs and security risks, while reducing impact. Furthermore, many drug-producing regions have nutrient-poor and fragile tropical soils, inappropriate for large-scale farming activity and unsuitable for increased human habitation. As reflected in the language of the FY 2005 Consolidated Appropriations Act, "narco-terrorist and paramilitary groups operate in many illicit crop-growing zones and make the presence of alternative development projects inadvisable in such locations. These narco-terrorist groups reap immense profit from the illegal trade, pose grave security risks for development personnel, and slow down project implementation."

Despite these obstacles to alternative development in Colombia, USAID and the GOC are moving forward with a robust alternative development program in many coca and opium producing areas. Since implementation began in the year 2000, USAID-assisted alternative development programs have:

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- Supported 218,333 hectares of licit crops in areas where illicit-crops were predominant
- Benefited 246,845 families
- Completed 1,199 social and productive infrastructure projects
- Created over 50,000 licit, full time jobs in FY07
- Strengthened over 111 municipalities through municipal tax code improvements and land titling

**USAID Programs:**

USAID's two 'flagship' alternative development programs are ADAM (Areas for Municipal Alternative Development – by its acronym in Spanish) and MIDAS (Increased Investment for Sustainable Alternative Development – by its acronym in Spanish). Both programs provide targeted interventions in the areas of rural Colombia that are vulnerable to the production of illicit crops.

**ADAM**

The “Alternative Development at the Municipal Level” program (ADAM), which began implementation during 2006, is supporting alternative development and local government strengthening activities in selected municipalities by helping farmers and others involved in illicit products to shift into licit activities or remain uninvolved in illicit crop production. ADAM supports institutional strengthening activities in these municipalities on development planning, municipal management, public services, finance and revenues, citizen participation and transparency, and for social and productive infrastructure projects. Linking these local government strengthening activities with income generating alternative development activities in a municipality is expected to increase the impact and sustainability of alternative development efforts. Some of the main productive activities supported in the ADAM municipalities are cacao, dairy, rubber, specialty coffee, forestry, fruits and other alternative development crops.

As of the end of March 2008, the ADAM program had assisted approximately 30,500 families and supported 51,121 hectares of legal crops. 972 communities and producer organizations made up of 78,552 families have signed 'illicit-free' agreements through ADAM-sponsored projects. When year three targets are met, ADAM will have supported a total of over 40,500 families, supported 264,000 hectares of licit crops, and created 53,000 jobs.

**MIDAS**

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The USAID initiative 'Increased Investment for Sustainable Alternative Development' (MIDAS) is a five-year, \$183 million program. MIDAS' objective is to generate economic and social alternatives to illicit crop production by promoting market-driven, private sector-led business initiatives in selected "economic corridors" of Colombia, and to enhance the competitiveness of the Colombian economy to meet national and international market demands, by promoting economic policy and institutional reforms. Activities began implementation during 2006.

MIDAS provides technical and financial support to design and implement private sector alternative development initiatives in the areas of agribusinesses, commercial forestry and a wide array of rural and peri-urban activities through small and medium sized enterprises (SME). As a complement, MIDAS supports the GOC with policy reforms and institutional strengthening in fiscal, financial, investment climate, trade, and land market access areas so as to maximize employment generation and income growth in Colombia.

The "economic corridors" where MIDAS resources are invested include the departments (states) of Antioquia, Atlántico, Bolívar, Caldas, Casanare, Cauca, César, Córdoba, Guajira, Huila, Magdalena, Nariño, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima, and Valle del Cauca. As of the end of March 2008 the MIDAS program has created over 88,000 jobs and supported the development of over 50,000 hectares of licit, sustainable crops.

#### **Alternative Development Programs by Department:**

The following sections outline the alternative development projects that are ongoing in areas where the GOC plans to spray illicit coca. This breakdown is intended to provide a general picture of the breadth and scope of these activities and is not an all-inclusive list that spans the entirety of all current projects.

#### **Antioquia**

The ADAM program in Antioquia supports cacao growers associations and local governments in the municipalities of Necoclí, Turbo, Arboletes, San Juan de Uraba, El Bagre, Zaragoza, and Caceres. ADAM projects support rubber production in Arboletes, San Juan de Uraba, El Bagre, Zaragoza and Nechí. ADAM also supports forestry projects in El Bagre, Nechí, Zaragoza, Necoclí y San

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Pedro de Urabá. ADAM also supports 300 families who produce vanilla in San Pedro de Urabá.

The MIDAS program continues to promote private sector involvement to help agricultural producers and others involved in illicit products to shift into legal activities or remain uninvolved in illicit coca production. The project targets rural families in coca regions and threatened zones and assists them by supporting strategic alliances between agribusiness firms and these families. Among the many projects supported by MIDAS in Antioquia are the following examples: MIDAS is helping to establish and maintain 1,678 hectares of sustainable forestry that will support 1,377 jobs in two municipalities of Antioquia. MIDAS is working with another project to support 611 hectares and over 1,000 jobs in fique (jute) in four departments including Antioquia. MIDAS supports two projects that are expected to establish 5,974 hectares of cacao and 2,715 associated jobs in four departments including Antioquia. MIDAS is supporting a forestry and shade grown coffee project that will support 26,864 hectares and target creation of over 6,500 jobs in seven departments including Antioquia. MIDAS supports a project to create 15,000 hectares of specialty coffee and 12,500 associated jobs in 11 departments including Antioquia. MIDAS also supports two other projects are expected to cultivate 2,215 hectares and 3,016 jobs for passion fruit in eight departments including Antioquia. MIDAS also supports a project to create 4,000 hectares of rubber trees and 1,818 associated jobs in four departments including Antioquia.

The GOC supports over 15,000 families in 15 municipalities in Antioquia through the Family Forest Guardians Program.

**Arauca**

USAID's Micro Finance Program has expanded into Arauca and provides direct technical assistance to lending institutions so that they can expand micro finance to potential small businesspeople in Arauca.

The GOC supports over 1,050 families in Arauca through the Family Forest Guardians Program.

**Bolivar**

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In Bolivar, the ADAM program is supporting alternative development productive projects in coffee, cacao, forestry, and small-scale oil palm production. ADAM contributes to infrastructure projects including housing for IDP's, school restaurant and water treatment facility construction, and road maintenance. ADAM also conducts municipal strengthening activities in selected municipalities and support for community action committees and citizen-run community radio stations.

MIDAS is helping to establish 8,000 hectares of small scale oil palm production that is expected to create 3,272 jobs in Bolivar. Through another project, MIDAS is helping to establish 2,515 hectares of small scale oil palm production that targets creation of 314 jobs in Bolivar and two other departments. MIDAS supports two other projects to cultivate 2,215 hectares of maracuya and 3,016 jobs in eight departments including Bolivar. MIDAS is helping to establish 3,635 hectares of cacao to create 1,652 jobs in Bolivar and three other departments. A MIDAS rubber project is working to establish 2,000 hectares of small scale rubber tree production and to create 909 jobs in Bolivar and two other departments. Two MIDAS pepper projects in Bolivar and three other departments will plant 688 hectares and support 1,348 jobs.

The GOC supports over 5,620 families in the southern Bolivar municipalities of Cantagallo, San Pablo, Santa Rosa del Sur, and Simití through the Family Forest Guardians Program

**Boyacá**

MIDAS is providing technical assistance for the socio-economic reintegration of 80 displaced families in Boyacá and supports a project to create 4,000 hectares of cacao and 1,818 associated jobs in four departments including Boyacá. MIDAS also provides technical assistance through two projects to strengthen producers associations in Boyacá. MIDAS supports a project to create 15,000 hectares of specialty coffee and 12,500 associated jobs in 11 departments including Boyacá.

The GOC is active in four municipalities of Boyacá supporting the cacao, poultry, and other productive activities of 2,987 families through its Family Forest Guardians Program.

**Caldas**

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USAID's Specialty Coffee program is promoting specialty coffee production, processing, and marketing in Caldas's illicit crop growing areas.

The MIDAS program is helping to establish 2,500 hectares of sustainable forestry that is expected to support 887 jobs in five municipalities of Caldas. MIDAS is also working with another project to support 611 hectares and to create over 1,000 jobs in jute in four departments including Caldas. MIDAS is supporting a forestry and shade grown coffee project that will support 26,864 hectares and over 6,500 jobs in seven departments including Caldas. MIDAS also supports a project to create 4,000 hectares of cacao and 1,818 associated jobs in four departments including Caldas. MIDAS supports a project to create 15,000 hectares of specialty coffee and 12,500 associated jobs in 11 departments including Caldas.

**Caquetá**

The GOC is active in four municipalities of Caquetá supporting the licit production activities of 2,700 families through its Family Forest Guardians Program. Acción Social and the Pan American Development Foundation (PADF) are also supporting a small-scale cattle production project in Caquetá.

**Cauca**

The ADAM program actively supports numerous alternative development productive projects, municipal and indigenous organizational strengthening activities, and community designed infrastructure construction projects in Cauca. Alternative development productive projects include specialty and organic coffee, cold climate fruits and flowers, vegetables, sugar cane, sustainable forestry and wood production, and fish farming. Indigenous projects in areas threatened by illicit crops include projects to strengthening local leadership and youth organizations, assist in municipal planning, promote marketing and commercialization of artisan work, and the construction of a milk processing facility. Alternative development infrastructure development projects include school, roadway, and social services center construction, aqueduct and sewer creation and maintenance. ADAM is also helping to strengthen municipal and youth associations and provides support to community citizen-run radio stations in various municipalities.

MIDAS is supporting communities through supported private sector investments in 250 hectares of hot peppers and that are expected to create 753 jobs

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in three departments including Cauca. A MIDAS specialty coffee project covering 13,000 hectares in Cauca and Nariño will support creation of 5,262 jobs. MIDAS supports two other projects that include 1,010 hectares of sustainably harvested forest and are expected to generate 260 jobs in Cauca and to finance a forestry and shade grown coffee project that will support 26,864 hectares and over 6,500 jobs in seven departments including Cauca. MIDAS also assists with the sustainable management of 7,000 hectares of natural forest on communal lands in Alto Guapi. MIDAS is also working with another project to support 190 hectares and over 152 jobs in fique (jute) in ten municipalities of Cauca. MIDAS also provides technical assistance to fruit and specialty coffee producers' associations in Cauca that support 1,231 families.

USAID's Specialty Coffee Program supports small scale coffee growers in Cauca by promoting specialty coffee production, processing and marketing in Cauca's illicit crop growing areas.

The GOC supports 4,369 families in four Cauca municipalities through the Family Forest Guardians Program.

César

The ADAM program is carrying out alternative development coffee and cacao production and helping to strengthen youth and women's organizations in the municipalities of Aguachica, La Gloria, and San Alberto.

MIDAS is supporting communities through supported private sector investments in 728 hectares of hot peppers that are expected to create 1,523 jobs in four departments including César. MIDAS also supports two other projects to cultivate maracuya and other fruits that will support 1,292 hectares and creation of 1,991 jobs in five departments including César. MIDAS supports two projects to create 13,549 hectares of cacao and 6,438 jobs in four departments including César. MIDAS also has two sustainable forestry projects covering 4,674 hectares and targeting creation of 1,493 jobs in César and three other departments. MIDAS supports two projects to create 16,650 hectares of specialty coffee and 13,906 associated jobs in 11 departments including César. Through nine other projects, MIDAS is helping to establish 19,223 hectares of small scale oil palm production that are expected to create 7,473 jobs in Bolivar and several other departments.

The GOC supports 517 families in two municipalities of César through the Family Forest Guardians Program.

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**Córdoba**

MIDAS supports two other projects to cultivate 732 hectares and 407 jobs in maracuya in five departments including Córdoba. MIDAS supports a Córdoba rubber tree project covering 1,100 hectares and 103 families and a cacao project in Córdoba of 1,107 hectares and 1,101 families. A MIDAS pepper project that includes 210 hectares in Córdoba and three other departments is expected to support 578 jobs.

The GOC supports 2,779 families in three municipalities of Córdoba through the Family Forest Guardians Program.

**Guaviare**

The GOC is active in San Jose del Guaviare and El Retorno supporting the legal productive activities of 1,056 families through its Family Forest Guardians Program. Accion Social, FUPAD, and the UNODC are also supporting small-scale cattle and cacao production in Guaviare and an ecotourism project.

**Huila**

The ADAM program is supporting passion fruit and blackberry production and local government strengthening activities with staff from the Department and the municipalities.

USAID's Specialty Coffee project is promoting specialty coffee production, processing, and marketing in poppy growing areas.

MIDAS is supporting a forestry and shade grown coffee project that will support 26,864 hectares and over 6,500 jobs in seven departments including Huila. MIDAS also supports three cacao projects in Huila that cover 691 hectares and are expected to generate 991 jobs. A MIDAS forestry project in Huila supports 1,788 hectares of sustainable forests that provide 826 jobs. Various MIDAS projects provide technical assistance to increase productivity and improve the marketing practices of fruit production that sustains 2,083 families and coffee cultivation that supports 5,995 families in Huila.

The GOC supports 4,706 families in eight municipalities of Huila through the Family Forest Guardians Program.

**Magdalena**

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MIDAS supports a project to cultivate 732 hectares in maracuya providing 407 jobs in five departments including Magdalena. MIDAS supports a project to create 9,500 hectares of cacao and 2,709 jobs in three departments including Magdalena. MIDAS also has two sustainable forestry projects covering 8,674 hectares and creating 2,232 jobs in four departments including Magdalena. MIDAS supports a project to create 30,000 hectares of specialty coffee and 43,472 associated jobs in 11 departments including Magdalena. Various MIDAS projects promote small scale palm oil production on 15,768 hectares that support 6,795 jobs in Magdalena. A MIDAS pepper and fruit production project supports 478 hectares and 770 jobs in four departments including Magdalena.

The GOC supports 1,774 families in Magdalena through the Family Forest Guardians Program.

**Meta**

The USAID Office of Transitions Initiative (OTI) program, known locally as Colombia Productiva, is helping the GOC to provide social services (health and education), interconnectivity (roads, electricity, water), and economic development (financial services, value chains, involvement of private sector) to six municipalities around the La Macarena national park in Meta. This assistance with small scale and short term economic development projects is a direct and civilian-led quick response to the demands of communities of small producers, and is part of the GOC's long term effort to increase civilian confidence in the state and consolidate state presence in this key area threatened by coca cultivation and high levels of violence.

The GOC supports 2,366 families in the Meta municipalities of Puerto Concordia, Puerto Lleras, Puerto Rico, and Vista Hermosa through the Family Forest Guardians Program

**Nariño**

The ADAM program in Nariño is supporting sustainable forestry, cacao, milk production, coconut, and food security activities and is strengthening local governments.

The Specialty Coffee project is promoting specialty coffee production, processing, and marketing in illicit crop growing areas of Nariño.

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Five MIDAS projects provide technical assistance to boost production and marketing prospects for over 5,880 families with small scale fruit, coffee and milk producing farms in Nariño. MIDAS supports two small scale oil palm projects over 8,241 hectares that provide 3,610 jobs in Nariño. MIDAS is working with another project to support 611 hectares and over 1,000 jobs in fique (jute) in four departments including Nariño. A MIDAS project supports 1,200 hectares of forestry, cacao, and plantain production that provides 1,342 jobs in Nariño. MIDAS also assists a project to improve the stewardship of 5,198 hectares of communal lands in Bajo Mira, Nariño.

The GOC supports 16,075 families in fourteen municipalities of Nariño through the Family Forest Guardians Program.

**Norte de Santander**

MIDAS supports a project to create 30,000 hectares of specialty coffee and 43,472 associated jobs in 11 departments including Norte de Santander. MIDAS projects also support the production of 2,237 hectares of cacao and 3,629 associated jobs in Norte de Santander. A MIDAS fruit production project supports 1,584 jobs over 560 hectares in Norte de Santander and another provides technical assistance for 336 fruit producing families. Two MIDAS projects assist the small scale palm oil production of 5,600 hectares that support 2,864 jobs in Norte de Santander.

The GOC supports 2,442 families in three municipalities of Norte de Santander through the Family Forest Guardians Program.

**Putumayo**

The ADAM program is supporting sustainable forestry and fish farming projects as well as the production of vanilla, pepper, and hearts of palm in the municipalities of Orito, Puerto Asis, Puerto Caicedo, San Miguel, Valle del Guamez, Mocoa, Villagarzón.

USAID, through a 50-50% joint funding agreement with the GOC, is jointly funding a \$25 million 47 kilometer stretch of road to connect southern Putumayo with departmental capital Mocoa and beyond that will lower transport costs and increase market access for agricultural producers.

The GOC supports 9,329 families in ten municipalities of Putumayo through the Family Forest Guardians Program.

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**Santander**

The ADAM program is supporting rubber, fish farming, sustainable forestry, cacao, fruit production, small scale cattle raising, and local government strengthening activities in Santander.

MIDAS supports four projects to create 17,117 hectares of cacao and 7,458 jobs in four departments including Santander. MIDAS supports a project to create 30,000 hectares of specialty coffee and 43,472 associated jobs in 11 departments including Santander. MIDAS helps two cacao projects that are expected to create 6,000 hectares of cacao and 2,727 associated jobs in 4 departments including Santander. MIDAS also supports four projects to cultivate 12,531 hectares of oil palm supporting 7,458 jobs in four departments including Santander. MIDAS projects provide technical assistance for 2,363 families that grow yucca, fruits, stevia, rubber, and family gardens in Santander.

The GOC supports 3,156 families in four municipalities of Santander through the Family Forest Guardians Program.

**Tolima**

The Specialty Coffee activity is promoting specialty coffee production, processing and marketing in illicit crop growing areas of Tolima.

ADAM is supporting cacao production in the municipalities of Ataco, Chaparral, Planadas, Rioblanco, Rovira, and San Antonio.

MIDAS supports two projects to assist 30,000 hectares of specialty coffee with 43,472 associated jobs in 11 departments including Tolima. MIDAS also supports two forestry projects in Tolima and seven other departments that support 29,564 hectares and 7,498 jobs. MIDAS projects in Tolima provide technical assistance to agricultural irrigation and drainage in Natagaima for 3,160 families, and increased production for coffee and fruits that support 2,806 families.

The GOC supports 7,828 families in four municipalities of Tolima through the Family Forest Guardians Program.

**Vaupes**

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The Sustainable Development for Indigenous Colombian Communities project is supporting traditional healers and helping to strengthen indigenous community organizations that are also involved in managing indigenous lands.

The GOC supports 1,154 families in Vaupes through the Family Forest Guardians Program.

**Vichada**

The GOC is providing institutional strengthening to indigenous community associations and provides food security and subsistence farming assistance to Vichada's most vulnerable populations through the Red de Seguridad Alimentaria. Through "Obras para la Paz" and "Vías para la Paz" the GOC is creating short term employment and through consultative physical infrastructure improvements that increase market access for local agricultural products.

**Attachments:**

- 1. Colombian Administrative Tribunal ruling of October 19, 2004, English language version**
- 2. Colombian State Council ruling of February 21, 2007, English language version**
- 3. Results of Aerial Eradication Program Soil and Water Sampling**
- 4. Ministry of Environment, Housing, and Territorial Development Ruling No. 707, July 26, 2004, English language version**
- 5. Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia, a report prepared for the Inter-American Drug Abuse Control Commission (CICAD) section of the OAS, March 31, 2005**

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**Annex 54**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA),  
OFFICE OF PESTICIDE PROGRAMS. DETAILS OF THE 2003  
CONSULTATION FOR THE DEPARTMENT OF STATE. USE OF  
PESTICIDE FOR COCA AND POPPY ERADICATION PROGRAM IN  
COLOMBIA, JUNE 2003**

*(United States Environmental Protection Agency, p.10, 13, 14)*





U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF PESTICIDE PROGRAMS

DETAILS OF THE 2003 CONSULTATION  
FOR THE DEPARTMENT OF STATE

USE OF PESTICIDE FOR COCA AND POPPY  
ERADICATION PROGRAM IN COLOMBIA

JUNE 2003

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to assess potential environmental and human health risks. The data required to make a safety finding are dependent on the intended use, e.g., food use vs non-food use. The data requirements for pesticides may be found in 40 CFR Part 158. For human health risk assessment, data is required to permit characterization of hazard and exposure.

Data requirements on the chemical identity and composition of the formulated pesticide product, may be found in 40 CFR 158.150. The list of ingredients for a pesticide product and the percent of each ingredient in the formulation are contained in the confidential statement of formula (CSF). The CSF is FIFRA confidential business information (CBI) and is entitled to treatment as trade secret or proprietary information. Agency risk assessments do not typically contain this information.

Residue chemistry data required as per 40 CFR 158.240 support the ability of the Agency to estimate the amount of pesticide that will result in food as a result of application of the pesticide according to the product labels directions for use. The magnitude of the residue studies for crop field trials use the typical end use product as the test material. The livestock feeding studies are required whenever a pesticide residue will be present in livestock feed. The livestock feeding studies evaluate the magnitude of the resulting pesticide residue in meat, milk, poultry, and eggs. The studies are conducted with the technical grade of the active ingredient or the plant metabolites. Residue chemistry data are also required to identify any potential metabolites of concern. These data are used to determine the tolerances for the parent and/or metabolites. Additional data is required on environmental fate, degradation, metabolism, and dissipation.

Hazard data required for human health risk assessment are provided in 40 CFR 158.340. The use of the active ingredient (i.e., food use or non-food use) will determine what studies are required. The acute toxicity data on the technical grade of the active ingredient are used for classification and precautionary labeling for protective clothing requirements, and worker reentry intervals. The only studies that are required to be conducted on the manufacturing use product or end use product are the acute toxicity studies. The remaining toxicology studies (e.g., developmental toxicity, reproduction, subchronic, chronic feeding, or carcinogenicity studies) require that the test substance is the technical grade of the active ingredient. Subchronic toxicity studies provide data on potential target organ toxicity and are also used to select dose levels for long term or chronic toxicity studies. Chronic toxicity or carcinogenicity studies are conducted for food use chemicals to determine potential effects following prolonged or repeated exposure that may have a latency period for expression. The test animals are exposed orally for a significant portion of their life span. Developmental toxicity studies are required in two species (usually the rat and rabbit) for food use chemicals. They are conducted to detect alterations in the normal development of fetuses following *in utero* exposure. The 2-generation rat reproductive toxicity study is required to assess potential alterations in gonadal function, estrus cycles, mating, conception, birth, lactation, weaning, as well as growth and development of offspring. The Agency also requires a battery of mutagenicity studies to assess the potential induction of changes in the genetic material of cells. The above studies are required for food use active ingredients. In general, less data is required for non-food use active ingredients and inerts unless a concern has triggered additional testing.

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battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a “Group E” chemical (no evidence of carcinogenicity to humans).

### Components of the Glyphosate Product

**1. Polyoxyethylene alkylamine (POEA).** POEA is a compound that is used as a surfactant with many glyphosate formulations. In a safety evaluation and risk assessment of glyphosate, the Roundup formulation and the surfactant POEA, Williams *et al.* (2000) reported that POEA can cause severe skin irritation and be corrosive to the eyes. In subchronic oral studies, POEA was mainly a gastrointestinal irritant in rats at high doses (~ 100 mg/kg/day) and in dogs at lower doses (30 mg/kg/day). In a developmental toxicity study in rats, POEA did not cause any developmental effects up to 300 mg/kg/day, but did induce maternal toxicity at 100 and 300 mg/kg/day (Farmer *et al.*, 2000). The concentrated formulated Roundup product can also be strongly irritating to the eyes and slightly irritating to the skin (Williams *et al.*, 2000).

**2. (information not included as it may be entitled to confidential treatment).** (*information not included as it may be entitled to confidential treatment*) are substances that are not highly toxic by oral or dermal routes and are not irritating to the skin. They may cause mild, transient eye irritation. Many (*information not included as it may be entitled to confidential treatment*) are known not to be sensitizers (*information not included as it may be entitled to confidential treatment*). The molecular weight of a (*information not included as it may be entitled to confidential treatment*) determines its biological properties, and, thus, its toxicity. The lower molecular weight (*information not included as it may be entitled to confidential treatment*) tend to be more toxic than the higher-weighted (*information not included as it may be entitled to confidential treatment*) and are absorbed by the digestive tract and excreted in the urine and feces, while the higher molecular weight (*information not included as it may be entitled to confidential treatment*) are absorbed more slowly or not at all (*information not included as it may be entitled to confidential treatment*). (*information not included as it may be entitled to confidential treatment*) have low acute and chronic toxicity in animal studies. No significant adverse effects have been noted in inhalation toxicology studies, carcinogen testing, or mutagen assays. High oral doses have resulted in toxic effects to the kidneys and loose feces (*information not included as it may be entitled to confidential treatment*). Topical dermal application of (*information not included as it may be entitled to confidential treatment*) to burn patients with injured skin has resulted in toxicity. (*information not included as it may be entitled to confidential treatment*).

### Cosmo - Flux 411F (Adjuvant)

The Cosmo-Flux 411F adjuvant product used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Agency is not in possession of toxicity data from direct dosing of test animals with Cosmo-Flux 411F. However, the Agency has made safety findings based on the toxicity of the individual components. As stated above, sale or use of spray adjuvant products in the U.S. are generally not regulated by EPA. However, the DoS

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has provided the EPA with a copy of this product's label and a description of the product ingredients. To be able to provide an opinion on hazard characterization of the CosmoFlux ingredients, the EPA relied on available technical information from various sources. Cosmo-Flux 411F consists mainly of (*information not included as it may be entitled to confidential treatment*) with a nonionic surfactant blend primarily composed of (*information not included as it may be entitled to confidential treatment*). All ingredients of this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. All components of the adjuvant have been approved for use in/on food by EPA (40 CFR 180.1001).

### **Components of CosmoFlux (Considered as CBI)**

**1. (*information not included as it may be entitled to confidential treatment*).** The (*information not included as it may be entitled to confidential treatment*) can cause dermal and ocular irritation and, in high doses orally, can cause significant toxicity. However, small amounts are not a concern and these substances have been approved as food additives by the FDA and are exempt from tolerances by EPA on certain commodities.

**2. (*information not included as it may be entitled to confidential treatment*).** The other major component of Cosmo-Flux 411F, (*information not included as it may be entitled to confidential treatment*), is not considered highly toxic. It may cause mild eye and skin irritation. The corresponding monoester, (*information not included as it may be entitled to confidential treatment*), has low subacute, subchronic and chronic oral toxicity and is used as a direct food additive and a component in cosmetics. The higher molecular weight triester is less likely to be absorbed orally or dermally and most likely of less toxicological concern. The other minor components, are not known to be highly toxic compounds and would not be of toxicological concern at the concentrations and conditions in which they are used.

### **E. Dose Response Assessment**

Dose response analysis is the second step in the risk assessment process i.e.; characterization of the quantitative relationship between exposure (dose) and response based on studies in which adverse health effects have been observed. The objective is to identify endpoints of concern which correspond to the route and duration of exposure based on the exposure patterns.

HED selects doses and endpoints (effects of concern) for risk assessment via an internal peer review process. HED uses a standing Committee - the Hazard Identification Assessment Review Committee (HIARC), to consider the available hazard data (studies required to be submitted by registrants in 40 CFR part 158 and open peer reviewed literature) to identify endpoints for use in risk assessment.

Ideally, each safety study identifies a dose level that does not produce a biological or statistically significant increased incidence of an adverse effect or no observable adverse effect level (NOAEL). The threshold dose is the smallest dose required to produce a detectable effect. Below this dose, there is no detectable response.

**Annex 55**

**NOTE FROM THE ENVIRONMENTAL PROTECTION AGENCY (EPA) TO  
THE UNITED STATES EMBASSY IN COLOMBIA, ENCLOSING ANSWERS  
AND BIBLIOGRAPHY OF STUDIES ON GLYPHOSATE HERBICIDE,  
23 SEPTEMBER 2011**

*(United States Environmental Protection Agency, United States Embassy in Bogotá)*





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION

September 23, 2011

Mr. James B. Story  
Director, Narcotics Affairs Section  
U.S. Embassy Bogota

Dear Mr. Story:

I am providing you with a revised U.S. EPA document ("Questions from U.S. Embassy, Bogota and Answers from U.S. EPA", dated September 23, 2011). The original version, dated September 20, 2011, was provided to you as an enclosure to the letter from Steven P. Bradbury, Ph.D., of the same date.

It was brought to our attention that our Answer 1 failed to include the number of pages of each study supporting the EPA registrations of the two products discussed in the document and cited in their bibliographies. Paragraph 3 is revised to include "(number of pages per study is 15 – 3,000)".

We've also expanded three answers for added clarity: Answers 1 and 4 regarding the previously submitted study bibliographies; and, Answer 9 regarding the Signal Words for products and their labels. We also added the document's title and EPA's logo to each page.

Should you have any further questions, please do not hesitate to contact me at 703/305-7099.

Sincerely,

A handwritten signature in black ink, appearing to read "Jay S. Ellenberger".

Jay S. Ellenberger  
Deputy Director  
Field and External Affairs Division  
Office of Pesticide Programs

Enclosure



September 23, 2011



## Questions from U.S. Embassy, Bogota and Answers from U.S. EPA

**Question 1)** Could EPA provide copies of the studies that Monsanto submitted as part of its registration application to EPA for the products FUETE SL and ROUNDUP SL? Could EPA provide access to those general glyphosate studies on which EPA bases its glyphosate product registration protocols? If this is not possible, please tell us why.

**Answer 1)** Monsanto submitted 560 scientific studies to support its application for registration of the product with these brand names. Following our review of these studies, the proposed product label, and other information, we registered this product in 1974, and assigned the EPA Registration Number 524-308 to it with these and other brand names (see Answer 2). EPA provided (email 9/13/11) the U.S. Embassy the bibliography (*Gdln sequence bibliography Roundup Herbicide.PDF*) of these studies. This set of studies applies to this product registration with the various brand names.

In order for EPA to provide copies of these studies to the U.S. Department of State or any other external entity EPA may provide copies of non-confidential studies to the U.S. Department of State, for transmittal to the Government of Colombia, but such disclosure is limited by the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, Section 10(g), as follows:

- Each person in the Department of State and in the Government of Colombia who desires access to a study must complete, sign, and submit to EPA an Affirmation of Non-Multinational Status (enclosed), in which the person affirms that he or she does not work for or represent a company that sells or distributes pesticides outside the United States.
- A person who receives a study after having signed an Affirmation of Non-Multinational Status may not disclose the document except to others who have submitted an Affirmation of Non-Multinational Status to EPA.

Also, in order for EPA to provide non-confidential studies we must search each study (number of pages per study is 15 – 3,000) for and redact any and all confidential information. See Answer 5 for our explanation of confidential information. These above requirements apply to all requests for studies of all pesticides.

If these statutory disclosure restrictions are problematic, for some studies EPA may be able to make available summary information that is not subject to the restrictions. A summary of EPA's assessments of glyphosate studies is presented in the agency's document *Reregistration Eligibility Decision (RED) Glyphosate* ([http://www.epa.gov/oppsrrd1/REDs/old\\_reids/glyphosate.pdf](http://www.epa.gov/oppsrrd1/REDs/old_reids/glyphosate.pdf)). Since the completion of this document (1993) EPA conducted and published in the Federal Register additional assessments to support registration of glyphosate products with additional uses and establishment of tolerances of residues on crops.

**Question 2)** Could EPA tell us which commercial products are registered under the EPA registration number 524-308, and explain why there is more than one product registered under the same number? Does that mean the products are identical or substantially similar?

September 23, 2011



### Questions from U.S. Embassy, Bogota and Answers from U.S. EPA

**Answer 2)** Only one product is registered under an EPA registration number. However, a registrant company may sell a product with one or more alternate brand names provided the registrant notifies the Agency and receives approval of those names. See Answer 3 for additional information. For the product with EPA Registration Number 524-308, the primary brand name is *Roundup Export Herbicide*. The registrant, Monsanto, notified EPA and received approval of several alternate brand names for this product, including *Fuete SL Herbicide*, *Roundup SL Herbicide*, *Roundup RT*, *Pondmaster Aquatic Herbicide*, *Mon-2139 Herbicide*, and *Roundup Super Concentrate*.

The product that is sold under these alternate brand names must be identical in ingredient formula composition and labeling to the product with the primary brand name, except the labels will have an alternate brand name and may have a subset of the approved uses of the registration. The registrant may not alter the precautionary labeling of a product sold under an alternate brand name. Also see Answer 3 for citations to federal regulations and EPA guidance pertaining to brand names.

**Question 3)** Is there a regulation, directive, or similar provision that allows for the inclusion of several products under a single registration number? If so, please provide a copy.

**Answer 3)** U.S. regulations do not allow registration of more than one product under a single registration number, but a registered product may be distributed and sold under one or more brand names as explained in Answer 2. Alternate brand names must be approved by EPA pursuant to the pesticide regulations at 40 CFR 156.10(b)(2)(ii) (<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=adc4e80a1778b6d0388b0bad3674befb&rgn=div8&view=text&node=40:24.0.1.1.7.1.1.2&idno=40>). Also see EPA's guidance to registrants on the use of alternate brand names at [http://www.epa.gov/PR\\_Notices/pr95-2.html](http://www.epa.gov/PR_Notices/pr95-2.html).

**Question 4)** What is the EPA registration number for GLY 41? Please provide copy of the registration, along with the studies submitted to EPA by the manufacturer with the registration application. Is RoundUp Ultra registered under the same number?

**Answer 4)** The EPA Registration Number for *GLY 41 Herbicide* is 524-475. *GLY 41 Herbicide* is an alternate brand name for the product whose primary brand name is *Roundup Ultra Herbicide*. This product is distributed and sold under several EPA-approved alternate brand names, including *Roundup Pro Herbicide*, *Roundup Original II CA*, *Roundup Ultra RT Herbicide*, *Roundup W Herbicide*, *Mon 77360 Herbicide*, and *GLY 41 Herbicide*. The product was originally registered on August 10, 1994 as *Mon 65005 Herbicide*. A copy of the registration notice is enclosed. A copy of the current and previous EPA-accepted labels for this and other pesticide products is available at <http://iaspub.epa.gov/apex/pesticides/f?p=101:1:3500685601885068>.

September 23, 2011



### Questions from U.S. Embassy, Bogota and Answers from U.S. EPA

Monsanto submitted 82 studies to support its registration application for this product. EPA provided (email 9/13/11) the U.S. Embassy the bibliography (*Gdln sequence bibliography Roundup Ultra Herbicide.PDF*) of these studies. This set of studies applies to this product registration with the various brand names. With regard to providing copies of these studies, please refer to our explanation in Answer 1.

**Question 5)** What is the legal basis that prevents EPA from being able to disclose certain information ("confidential business information") about the chemical composition of registered herbicides? Exactly what information is subject to confidential treatment? Please annex a copy of the corresponding legal provisions.

**Answer 5)** Section 10(b) of FIFRA, 7 U.S.C. §136h (<http://www.gpo.gov/fdsys/pkg/USCODE-2010-title7/html/USCODE-2010-title7-chap6-subchapII-sec136h.htm>), requires EPA to protect information that "contains or relates to trade secrets or commercial or financial information obtained from a person and privileged or confidential." Under U.S. law, the test for §10(b) confidentiality is whether disclosure of the information would be likely to cause substantial competitive harm to the affected business.

EPA regulations at 40 CFR 2.204 (<http://www.epa.gov/epafoia1/2204.htm>) require the Agency to initially protect information claimed as confidential as well as information where the Agency might expect a company to assert a confidentiality claim if it knew EPA was considering disclosure of the information. Inert ingredients in pesticides are frequently claimed as confidential by registrants, so the Agency routinely gives inert ingredients such initial protection. If and when the need arises to evaluate whether specific ingredients in specific formulations are entitled to confidential treatment, EPA takes action under 40 CFR 2.204 (<http://www.epa.gov/epafoia1/2204.htm>) and 2.205 (<http://www.epa.gov/epafoia1/2205.htm>) to issue a formal confidentiality determination for the information. In addition, as noted in the answer to Question 1, FIFRA §10(g) imposes additional protection on information submitted under FIFRA, regardless of whether the information is entitled to confidentiality under §10(b).

**Question 6)** Why does the label for the commercial product Roundup Export read "Not Registered for use in the United States of America"? Is its use banned in the United States? What does the fact that it holds an EPA registration number signify?

**Answer 6)** *Roundup Export Herbicide* is the primary brand name for the glyphosate product registered under EPA Registration Number 524-308. This product's sale and use are not banned in the United States. In 1997, Monsanto voluntarily added this statement ("Not Registered for Use in the United States of America.") to the label of this brand name and voluntarily chose to market this product only outside of the United States. This registration has several alternate brand names (see Answer 2). Labels with these alternate brand names do not have the above statement and are marketed in the United States. EPA acknowledges the label statement is confusing and has initiated communications with Monsanto to revise or delete this statement.



September 23, 2011

## Questions from U.S. Embassy, Bogota and Answers from U.S. EPA

**Question 7)** What does it mean for a product to have an EPA Registration? What requirements have to be met in order for a product's registration to be approved?

**Answer 7)** An EPA Registration Number signifies that EPA has determined, pursuant to section 3 of FIFRA that:

- (A) the product's composition is such as to warrant the proposed claims for it;
- (B) the product's labeling and other material required to be submitted comply with the requirements of FIFRA;
- (C) the product will perform its intended function without unreasonable adverse effects on the environment; and
- (D) when used in accordance with widespread and commonly recognized practice the product will not generally cause unreasonable adverse effects on the environment. (Note: The term "unreasonable adverse effects on the environment" means (1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide, or (2) a human dietary risk from residues that result from a use of a pesticide in or on any food that is inconsistent with the safety standard under section 408 of the Federal Food, Drug, and Cosmetic Act.)

In order to make these determinations, EPA requires information and data pertaining to the pesticide active ingredient as well as the formulated product (<http://www.epa.gov/opp00001/regulating/fifra.pdf>). Data required for registration may include product chemistry, toxicology, environmental fate, ecological effects, and exposure studies. The data requirements for pesticides are specified in the regulations at 40 CFR Part 158 (<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=adc4e80a1778b6d0388b0bad3674befb&rgn=div5&view=text&node=40:24.0.1.1.9&idno=40>). In addition to fulfilling EPA's data requirements, an applicant for registration must submit labeling that complies with the regulations at 40 CFR Part 156 (<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=adc4e80a1778b6d0388b0bad3674befb&rgn=div5&view=text&node=40:24.0.1.1.7&idno=40>) and other Agency guidance, including the Agency's Label Review Manual (<http://www.epa.gov/oppfead1/labeling/lrm/>). EPA reviews the submitted data and labeling for each pesticide product to determine whether the criteria for registration have been met.

Additionally, by law (Federal Food, Drug, and Cosmetic Act), EPA establishes maximum residue limits (or "tolerances") of pesticides, including glyphosate, that are applied to food crops and livestock feed crops. Tolerances are based on the results of residue field trials. However, before EPA can establish a tolerance, the agency must make the safety finding required by Section 408 of FFDCA; i.e., that there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information. More information about EPA's responsibility for tolerances is available at <http://epa.gov/pesticides/regulating/tolerances.htm> and the established tolerances for glyphosate are published in the regulations at 40 CFR 180.364 and also available at <http://cfr.vlex.com/vid/180-364-glyphosate-tolerances-residues-19814904>.

September 23, 2011



### Questions from U.S. Embassy, Bogota and Answers from U.S. EPA

**Question 8)** Do the risks to human health mentioned on herbicide labels depend on the level of exposure by a given individual to the product? Is there any difference when the individual is a mixer, loader, applicator, or a bystander? Do those warnings or cautions refer to the use of the original (undiluted, unmixed) product?

**Answer 8)** Labels of herbicide and other pesticide products have precautionary and use restriction statements for protection of people. In most cases the origin of these statements for a product is based on EPA's assessment of the scientific data and other information supporting the registration of the product. These data and information sources can include toxicology studies on the active ingredient as well as the formulated product, exposure studies of mixers, loaders, applicators, and bystanders, physical/chemistry studies, and incident reports. EPA uses this information to determine potential risks to people who may be exposed to the ingredients and application material (spray, dust, granules, etc.) prior to, during, or after application. Thus, some precautions and restrictions apply to undiluted product and diluted spray mixture, e.g., restrictions that pertain to mixer/loaders versus applicators or bystanders. Based on these risks, EPA determines the appropriate precautions and restrictions to mitigate exposures to ensure the risks to people will be at acceptable levels when the product is used according to the label directions and restrictions. Examples of such precautions and restrictions are signal words and first aid statements, reentry restrictions to treated areas, use of personal protective clothing and equipment, and buffer zones.

As an example, the precautionary statements that appear on pesticide labels (i.e., the Signal Word, Hazards to Humans and Domestic Animals, and First Aid statements) are typically determined by the results of the six acute toxicity studies performed with the undiluted product formulation. The acute oral, acute dermal and acute inhalation studies evaluate systemic acute toxicity via the designated routes of exposure. The primary eye irritation and primary skin irritation studies measure irritation or corrosion potential, while the dermal sensitization study evaluates the potential for allergic contact dermatitis. With the exception of dermal sensitization, each acute study is assigned to a toxicity category (I to IV) based on the study results, with I being the most toxic (or irritating/corrosive) and IV being the least toxic (or irritating/corrosive). The toxicity categories determine certain precautionary statements that appear on pesticide labels as described in detail in Chapter 7 of EPA's *Label Review Manual* (<http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf>). Table 1 of that chapter provides the specific ranges of toxicity values for each toxicity category.

Other precautions or restrictions may be imposed by regulations that apply to all pesticides or a certain group of pesticides, such as those with agricultural uses. These generic precautions and restrictions are regarded as good and appropriate practice to follow when handling or applying pesticides of that group. Some examples of generic statements are "Keep out of reach of children."; "It is a violation of Federal law to use this product inconsistent with its labeling."; "Do not apply this product in a way that will contact workers or other persons, either directly or through drift."

Sources of information about EPA requirements for precautionary and restriction statements include EPA's *Pesticide Registration Manual (Blue Book)* at

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<http://www.epa.gov/pesticides/bluebook/>; the *Label Review Manual* at <http://www.epa.gov/oppfead1/labeling/lrm/>; and more specifically for glyphosate products EPA's Reregistration Eligibility Decision Document for glyphosate at [http://www.epa.gov/oppsrrd1/REDS/old\\_reds/glyphosate.pdf](http://www.epa.gov/oppsrrd1/REDS/old_reds/glyphosate.pdf).

Also, the registrant may voluntarily include additional use restrictions he/she believes are appropriate for their product in proposing their product label with their application for registration. Generally, EPA will allow such restrictions unless the agency concludes from its assessment of the supporting data and label that such restrictions are in conflict with its assessment, regulations or policies.

**Question 9)** Could EPA explain why and how a label for a given product is ordered to contain a "Danger Signal Word", a "Warning", or "Caution"? What is the difference between the three designations?

**Answer 9)** As explained in Answer 8, a Signal Word is required for all registered pesticide products unless the pesticide product meets the criteria of Toxicity Category IV by all routes of exposure in the acute toxicity studies. The Signal Word for a product is determined by the single study with the most severe toxicity category from the five acute toxicity studies (acute oral, dermal, and inhalation toxicity; primary eye and skin irritation) or by the presence of methanol in concentrations of 4% or more. Any product containing methanol in excess of 4% must have a signal word of DANGER. Refer to <http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf> for detailed information about Signal Word requirements. For all other products, the Signal Words and associated toxicity categories are as follows:

Toxicity Category I: DANGER

Toxicity Category II: WARNING

Toxicity Category III: CAUTION

Toxicity Category IV: No Signal Word required, however if a Signal Word is used it must be CAUTION.

For example, for the product with EPA Registration Number 524-308, the signal word is DANGER because the results of the primary eye irritation study with this product's formulation met the criteria for Toxicity Category I. However, this product has low acute toxicity via the oral, dermal, and inhalation routes of exposure and is not a skin irritant or dermal sensitizer. The results of the acute toxicity studies for this product place it in the following acute toxicity categories:

Acute Oral: III

Acute Dermal: IV

Acute inhalation: IV

Primary Eye: I

Skin Irritation: IV

Dermal Sensitization: Non-sensitizing.

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- 111952 Rausina, G. (1973) Report to ...: Four-day Static Fish Toxicity Study with Roundup in Carp: IBT No. 621-04177. (Unpublished study received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:234153-A)
- 124760 Forbis, A.; Boudreau, P.; Cranor, W. (1982) Dynamic 96-hour Acute Toxicity of Roundup (AB-82-33) to Bluegill Sunfish (*Lepomis macrochirus*): Dynamic Acute Bioassay Report #28746. (Unpublished study received Dec 27, 1982 under 524-308; prepared by Analytical Bio-Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:249159-A)
- 124761 Forbis, A.; Boudreau, P.; Schofield, M. (1982) Dynamic 96-hour Acute Toxicity of Roundup (AB-82-34) to Rainbow Trout (*Salmo gairdneri*): Dynamic Acute Bioassay Report #28745. (Unpublished study received Dec 27, 1982 under 524-308; prepared by Analytical Bio-Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:249159-B)
- 136339 Thompson, C.; Mcallister, W. (1978) Acute Toxicity of Technical Glyphosate (AB-78-165) to Rainbow Trout (*Salmo gairdneri*). (Unpublished study received Dec 5, 1978 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:097661-B)
- 162296 Folmar, L.; Sanders, H.; Julin, A. (1979) Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. *Arch. Environm. Contam. Toxicol.* 8:269-278.
- 40579201 Mitchell, D.; Chapman, P. (1986) Acute Toxicity of Roundup Herbicide to Chinook Salmon: Proj. I.D. EV-85-046. Unpublished study prepared by EVS Consultants. 26 p.
- 40579202 Mitchell, D.; Chapman, P. (1986) Acute Toxicity of Roundup Herbicide to Coho Salmon: Proj. I.D. EV-85-047. Unpublished study prepared by EVS Consultants. 26 p.
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## 72-2 Acute Toxicity to Freshwater Invertebrates

| MRID  | Citation Reference  |
|-------|---|
| 70893 | LeBlanc, G.A.; Surprenant, D.C.; Sleight, B.H., III (1980) Acute Toxicity of Roundup to the Water Flea ( <i>Daphnia magna</i> ): Report #BW-80-4-636; Monsanto Study No. BN-80-079. (Unpublished study, including letter dated Feb 21, 1980 from R. Oleson to Robert B. Foster, received Apr 2, 1981 under 524-308; prepared by EG & G, Bionomics, submitted by Monsanto Co., Washington, D.C.; CDL:244749-B) |

- 78657 Forbis, A.D.; Boudreau, P. (1980) Acute Toxicity of MON 2139-NF-80W (AB-80-365) to *Daphnia magna*: Static Acute Bioassay Report #26317. (Unpublished study received Jul 1, 1981 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:070171-D)
- 78660 Boudreau, P.; Forbis, A.D. (1980) The Acute Toxicity of MON 2139 NF-80-AA (AB-80-369) to *Daphnia magna*: Static Acute Bioassay Report #26320. (Unpublished study received Jul 1, 1981 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:070171-G)
- 78663 Forbis, A.D.; Boudreau, P. (1981) Acute Toxicity of MON 0139 (Lot LURT 12011) (AB-81-074) to *Daphnia magna*: Static Acute Bioassay Report #27203. (Unpublished study received Jul 1, 1981 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL: 070171-J)
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- 108172 McAllister, W.; Forbis, A. (1978) Acute Toxicity of Technical Glyphosate (AB-78-201) to *Daphnia magna*. (Unpublished study received Dec 27, 1978 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:097759-C)
- 124762 Forbis, A.; Boudreau, P.; Schofield, M. (1982) Dynamic 48-hour Acute Toxicity of Roundup (AB-82-035) to *Gammarus pseudolimnaeus*: Dynamic Acute Bioassay Report #28747. (Unpublished study received Dec 27, 1982 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:249159-C)
- 136338 McAllister, W.; Forbis, A. (1978) Acute Toxicity of Technical Glyphosate (AB-78-201) to *Daphnia magna*. (Unpublished study received Dec 5, 1978 under 524-308; prepared by Analytical Bio Chemistry Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:097661-A)
- 162296 Folmar, L.; Sanders, H.; Julin, A. (1979) Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Arch. Environm. Contam. Toxicol. 8:269-278.

### 72-3 Acute Toxicity to Estuarine/Marine Organisms

#### MRID

#### Citation Reference

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- 40579204 Mitchell, D.; Chapman, P. (1986) Seawater Challenge Testing of Coho Salmon Smolts Following Roundup Herbicide Exposure: Proj. I.D. EV-85-045. Unpublished study prepared by EVS Consultants. 34 p.

### 72-4 Fish Early Life Stage/Aquatic Invertebrate Life Cycle Study

#### MRID

#### Citation Reference



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- 26483 Russell, M. (1972) Report to Monsanto Company: Four-Day Static Fish Toxicity Studies with CP 67573 in Rainbow Trout and Bluegills: IBT No. R2278. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093848-J)
- 26484 U.S. Bureau of Sport Fisheries and Wildlife, Fish Control Laboratories. (1969) Summary Results of Preliminary Bioassays. (Unpublished study received on unknown date under 4G1444; submitted by Monsanto Co., Washington, D.C.; CDL:093848-K)
- 32433 Rausina, G. (1974) Report to Monsanto Company: Four-Day Static Fish Toxicity Study with Mon 2139 in Channel Catfish: IBT No. 621-05412. (Unpublished study received May 27, 1975 under unknown admin. no.; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:123742-A)

### 72-5 Life cycle fish

| MRID   | Citation Reference   |
|--------|--|
| 108171 | EG & G, Bionomics (1975) Chronic Toxicity of Glyphosate to the Fathead Minnow ( <i>Pimephales promelas</i> , Rafinesque). (Unpublished study received Dec 27, 1978 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:097759-B) |

### 81-1 Acute oral toxicity in rats

| MRID  | Citation Reference   |
|-------|--|
| 39935 | Monsanto Company (1974) Toxicology Data on O-Methyl-N,N'-dicyclohexyl pseudourea: Project No. Y-73-274. (Unpublished study received Jan 31, 1977 under 524-308; CDL:095788-H)  |
| 40551 | Ebbens, K. (1972) Report to Monsanto Company: Acute Oral Toxicity Study with CP 67573 in Albino Rabbits: IBT No. A2277. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-C) |
| 40552 | Birch, M.D. (1972) Toxicological Investigation of: Mon 2139: Project No. Y-72-160-A. (Unpublished study received on unknown date under 4G1444; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-E)  |
| 57070 | Younger Laboratories, Incorporated (1976) (Toxicity to Rats of CP 76100 and CP 76976): Project No. Y-76-122. (Compilation; unpublished study including project no. Y-75-309, received May 12, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:229785-C)                     |
| 67039 | Birch, M.D. (1970) Toxicological Investigation of CP 67573-3: Project No. Y-70-90. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-C)  |

- 67040 Birch, M.D. (1971) Toxicological Investigation of CP 70139 For- mulation (MON 2139) 3 Lbs./Gal.--Lot: XHB-92: Project No. Y- 71-150. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-E)
- 77226 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Oral Toxicity of MON 2139 NF-80-W to Rats: EHL 800294. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-F)
- 77230 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Oral Toxicity of MON 2139 NF-80-AA to Rats: EHL 800290. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-J)
- 77234 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Oral Toxicity of Mon 0139 to Rats: EHL 800257. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Wash- ington, D.C.; CDL:070170-N)
- 108233 Monsanto Co. (1979) Overview of Acute Toxicity Studies: ?Roundup and Other MAPC Products|. Summary of studies 241301-C through 241301-E and 241301-G through 241301-J. (Unpublished study re- ceived Oct 16, 1979 under 524-308; CDL:241301-A)
- 108234 Oleson, F. (1979) Letter sent to W. Carpenter dated Aug 28, 1979: Acute toxicity studies with Roundup formulation; BDN-77-429; B/d Nos. 4884-77; 4885-77; 4886-77. (Unpublished study re- ceived Oct 16, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:241301-B)
- 108235 Braun, W.; Rinehart, W. (1979) Acute Oral Toxicity Study in Rats: ?Roundup|: Project No. 4884-77; BDN-77-429. (Unpublished study received Oct 16, 1979 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-C)
- 108239 Heenehan, P.; Rinehart, W.; Braun, W. (1979) Acute Oral Toxicity Study in Rats: ? Glyphosate Technical|: Project No. 4880-77; BDN- 77-428. (Unpublished study received Oct 16, 1979 under 524- 308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-G)
- 43434501 Blaszcak, D.; Auletta, C. (1994) Acute Oral Toxicity Study in Rats: MON-2139 Herbicide: Lab Project Number: BD/87/283: 4546/87: 1276. Unpublished study prepared by Bio/dynamics, Inc. 19 p.

## 81-2 Acute dermal toxicity in rabbits or rats

| MRID  | Citation Reference  |
|-------|---|
| 39935 | Monsanto Company (1974) Toxicology Data on O-Methyl-N,N'-dicyclo- hexyl pseudourea: Project No. Y-73-274. (Unpublished study re- ceived Jan 31, 1977 under 524-308; CDL:095788-H)   |
| 67039 | Birch, M.D. (1970) Toxicological Investigation of CP 67573-3: Project No. Y-70-90. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-C) |
| 67040 | Birch, M.D. (1971) Toxicological Investigation of CP 70139 For- mulation (MON 2139) 3 Lbs./Gal.--Lot: XHB-92: Project No. Y- 71-150. (Unpublished study received Jan 30, 1973   |

- under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-E)
- 77227 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Dermal Toxicity of Mon 2139 NF-80-W to Rabbits: EHL 800295. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-G)
- 77231 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Dermal Toxicity of MON 2139 NF-80-AA to Rabbits: EHL 800291. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-K)
- 77235 Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Acute Dermal Toxicity of MON 0139 to Rabbits: EHL 800258. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-O)
- 108236 Braun, W.; Rinehart, W. (1979) Acute Dermal Toxicity Study in Rabbits: ?Roundup|: Project No. 4885-77; BDN-77-429. (Unpublished study received Oct 16, 1979 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-D)
- 43434502 Blaszcak, D.; Auletta, C. (1994) Acute Dermal Toxicity Study in Rats: MON-2139 Herbicide: Lab Project Number: BD/87/283: 4547/87: 1276. Unpublished study prepared by Bio/dynamics, Inc. 15 p.

### 81-3 Acute inhalation toxicity in rats

| MRID   | Citation Reference  |
|--------|---|
| 40562  | Fritz, J. (1972) Report to Monsanto Company: Acute Vapor Inhalation Toxicity Study with Mon-2139 in Albino Rats: IBT No. T2279. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-P)  |
| 98377  | Velasquez, D.J.; Roloff, M.V.; Folk, R.M. (1982) Acute Inhalation Toxicity of Roundup (R) Formulation to Male and Female Sprague-Dawley Rats: Study No. 810093. (Unpublished study received Apr 12, 1982 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:247188-A)  |
| 108120 | Myers, T. (1975) Report to Monsanto Company: Acute Aerosol Inhalation Toxicity Study in Rats: IBT No. 663-06290. (Unpublished study received Sep 25, 1975 under 6G1679; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:094683-D)  |
| 124230 | Monsanto Co. (1983) Acute Inhalation Toxicity of Roundup Formula- tion to Rats: Special Report MSL-2154. (Compilation; unpub- lished study received Jan 20, 1983 under 524-308; CDL:249301-A)   |
| 137704 | Velasquez, D.; Thake, D.; Roloff, M.; et al. (1983) Four-week Study of 33-1/3% Use- dilution of Roundup Herbicide in Water Administered to Male and Female Sprague-Dawley Rats by Inhalation: Study No. 830025: DMEH Project No. ML-83-015. (Unpublished study received Mar 9, 1984 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:252621-A) |

43404903 Bechtel, C. (1994) Acute Inhalation Study of MON 8001 Herbicide: Lab Project Number: EHL/94059; ML/94/129; MSL/13773. Unpublished study prepared by Monsanto Environmental Health Lab. 53 p.

#### 81-4 Primary eye irritation in rabbits

| MRID   | Citation Reference   |
|--------|--|
| 39935  | Monsanto Company (1974) Toxicology Data on O-Methyl-N,N'-dicyclo- hexyl pseudourea: Project No. Y-73-274. (Unpublished study re- ceived Jan 31, 1977 under 524-308; CDL:095788-H)  |
| 67039  | Birch, M.D. (1970) Toxicological Investigation of CP 67573-3: Project No. Y-70-90. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-C)  |
| 67041  | Birch, M.D. (1971) Eye Irritation in Rabbits after Application of CP 70139 Formulation (MON 2139) 3 Lbs./Gal.--Lot: XHB-92: Proj- ect No. Y-71-155. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-F) |
| 77228  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Eye Irritation of MON 2139 NF-80-W to Rabbits: EHL 800297. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-H)  |
| 77232  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Eye Irritation of MON 2139 NF-80-AA to Rabbits: EHL 800293. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-L)   |
| 77236  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Eye Irritation of MON 0139 to Rabbits: EHL 800260. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-P)  |
| 108093 | Birch, M. (1974) Toxicologic Investigation of Roundup: Project No. Y-74-56. (Unpublished study received Apr 26, 1974 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:050130-A)   |
| 108094 | Birch, M. (1974) Toxicologic Investigation of Roundup: Project No. Y-74-74. (Unpublished study received Nov 9, 1973 under 524- 308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:050130-B)   |
| 108095 | Monsanto Co. (19??) Roundup: Rabbit Eye Irritation Tests. (Un- published study received Nov 9, 1973 under 524-308; CDL: 050131-A)  |
| 108233 | Monsanto Co. (1979) Overview of Acute Toxicity Studies: ?Roundup and Other MAPC Products]. Summary of studies 241301-C through 241301-E and 241301-G through 241301-J. (Unpublished study re- ceived Oct 16, 1979 under 524-308; CDL:241301-A)   |
| 108238 | Oleson, F. (1979) Letter sent to W. Carpenter dated Aug 29, 1979: Acute toxicity studies with glyphosate technical; BDN-77-428; B/d Nos. 4880-77; 4881-77; 4883-77. (Unpublished study re- ceived Oct 16, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:241301-F)                         |

- 108241 Heenehan, P.; Braun, W.; Rinehart, W. (1979) Rabbit Eye Irritation Study: ?Glyphosate Technical|: Project No. 4882-77; BDN-77-428. (Unpublished study received Oct 16, 1979 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-I)
- 41689301 Blaszcak, D. (1990) Eye Irritation in Rabbits: Lab Project Number: BD-90-314: 5864-90: 1021. Unpublished study prepared by Bio/ dynamics Inc. 18 p.
- 41925801 Blaszcak, D. (1991) Primary Eye Irritation Study in Rabbits with MON-8709: Lab Project Number: BD-91-122/6031-91: R.D. NO. 1050. Unpublished study prepared by Bio/Dynamics Inc. 18 p.
- 43434503 Blaszcak, D.; Auletta, C. (1994) Eye Irritation Study in Rabbits: MON-2139 Herbicide: Lab Project Number: BD/90/246: 5833/90: 1276. Unpublished study prepared by Bio/dynamics, Inc. 17 p.
- 44611101 Blaszcak, D. (1998) Primary Eye Irritation Study in Rabbits: MON 77959: Final Report: Lab Project Number: 1427: 98-1783: HU-98-080. Unpublished study prepared by Huntingdon Life Sciences. 32 p.

### 81-5 Primary dermal irritation

| MRID   | Citation Reference  |
|--------|---|
| 39935  | Monsanto Company (1974) Toxicology Data on O-Methyl-N,N'-dicyclo- hexyl pseudourea: Project No. Y-73-274. (Unpublished study received Jan 31, 1977 under 524-308; CDL:095788-H)   |
| 67039  | Birch, M.D. (1970) Toxicological Investigation of CP 67573-3: Project No. Y-70-90. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-C) |
| 77229  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Skin Irritation of MON 2139 NF-80-W to Rabbits: EHL 800296. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-I)            |
| 77233  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Skin Irritation of MON 2139 NF-80-AA to Rabbits: EHL 800292. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington D.C.; CDL:070170-M)            |
| 77237  | Branch, D.K.; Stout, L.D.; Folk, R.M. (1981) Primary Skin Irritation of MON 0139 to Rabbits: EHL 800259. (Unpublished study received Jul 1, 1981 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:070170-Q)                    |
| 108093 | Birch, M. (1974) Toxicologic Investigation of Roundup: Project No. Y-74-56. (Unpublished study received Apr 26, 1974 under 524-308; prepared by Younger Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:050130-A)          |
| 108233 | Monsanto Co. (1979) Overview of Acute Toxicity Studies: ?Roundup and Other MAPC Products . Summary of studies 241301-C through 241301-E and 241301-G through 241301-J. (Unpublished study received Oct 16, 1979 under 524-308; CDL:241301-A)  |
| 108237 | Heenehan, P.; Braun, W.; Rinehart, W. (1979) Primary Dermal Irritation Study in   |

- Rabbits: ?Roundup]: Project No. 4886-77; BDN- 77-429. (Unpublished study received Oct 16, 1979 under 524- 308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-E)
- 108238 Oleson, F. (1979) Letter sent to W. Carpenter dated Aug 29, 1979: Acute toxicity studies with glyphosate technical; BDN-77-428; B/d Nos. 4880-77; 4881-77; 4883-77. (Unpublished study re- ceived Oct 16, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:241301-F)
- 108240 Heenehan, P.; Rinehart, W.; Braun, W. (1979) Acute Dermal Toxicity Study: ?Glyphosate Technical]: Project No. 4881-77; BDN-77-428. (Unpublished study received Oct 16, 1979 under 524-308; pre- pared by Bio/dynamics, Inc., submitted by Monsanto Co., Wash- ington, DC; CDL:241301-H)
- 108242 Heenehan, P.; Braun, W.; Rinehart, W. (1979) Primary Dermal Ir- ritation Study in Rabbits: ?Glyphosate Technical]: Project No. 4883-77; BDN-77-428. (Unpublished study received Oct 16, 1979 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:241301-J)
- 43434504 Blaszcak, D.; Auletta, C. (1994) Primary Dermal Irritation Study in Rabbits: MON-2139 Herbicide: Lab Project Number: BD/87/283: 4548/87: 1276. Unpublished study prepared by Bio/dynamics, Inc. 14 p.

## 81-6 Dermal sensitization

| MRID     | Citation Reference   |
|----------|--|
| 137137   | Auletta, C.; Daly, I.; Blaszcak, D.; et al. (1983) A Dermal Sensitization Study in Guinea Pigs: (Roundup Formulation): Bio/dynamics Project No. 4234-83; Monsanto Reference No. BD-83-007. (Unpublished study received Jan 5, 1984 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:252142-A) |
| 137138   | Auletta, C.; Daly, I.; Blaszcak, D.; et al. (1983) A Dermal Sensitization Study in Guinea Pigs: (Glyphosate): Bio/dynamics Project No. 4235-82; Monsanto Reference No. BD-83-008. (Unpublished study received Jan 5, 1984 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL: 252142-B)         |
| 43404902 | Blaszcak, D. (1994) Closed-Patch Repeated Dermal Sensitization Study in Guinea Pigs with MON 0139 (Buehler Method): Lab Project Number: R/D/1276: 94/1006: PL/94/128. Unpublished study prepared by Pharmaco LSR Inc. 28 p.  |

## 82-1 Subchronic Oral Toxicity: 90-Day Study

| MRID  | Citation Reference   |
|-------|--|
| 36322 | Paa, H.; Kopplin, R.P.; Richter, W.R. (1974) Report to Monsanto Company: 21-Day Subacute Oral Toxicity Study with CP-67573 Tech- nical in Male Albino Rabbits: IBT No. 601-05044. (Unpublished study including submitter summary, received Sep 26, 1975 under 6G1679; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., |

- Washington, D.C.; CDL:096483-G)
- 36803 Street, R.W.; Conkin, R.A.; Edwards, G.A.; et al. (1980) A Three- Month Feeding Study of Glyphosate in Mice: Special Report # MSL- 1154. (Unpublished study received Jul 2, 1980 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:242799-A)
- 40557 Burtner, B.R.; Lindberg, D.C. (1972) Report to Monsanto Company: Ninety-Day Subacute Oral Toxicity Study with CP 67573 in Beagle Dogs: IBT No. C1021. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-J)
- 61114 Smith, P.S.; Yost, D.H. (1972) Report to ...: 90-Day Subacute Oral Toxicity Study with CP 67573 in Albino Rats: IBT No. B1020. (Unpublished study, including sponsor's validation report dated Apr 6, 1978, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234137-I)
- 67043 Smith, P.S.; Yost, D.H. (1972) Report to ...: 90-Day Subacute Oral Toxicity Study with CP 67573 in Albino Rats: IBT No. B1020. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-O)
- 93424 Burtner, B.R.; Lindberg, D.C.; Yost, D.H. (1972) Report to ...: Ninety-day Subacute Oral Toxicity Study with CP 67573 in Beagle Dogs: IBT No. C1021. (Unpublished study received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234138-A)
- 108197 Fletcher, D. (1974) Report to Monsanto Company: Residue Study with 75%w CP 67573 XHB-87 and 25% CP 5043S XHD-115 in White Leghorn Chickens: IBT No. 651-03918. (Unpublished study received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:234148-A)
- 124130 Ahmed, F.; Tegeris, A.; Underwood, P.; et al. (1982) CP 76100: 91- day Intubation Study in the Rat: Report No. 7934; Report No. 79- 012. (Unpublished study received Dec 27, 1982 under 524-308; prepared by Pharmacopathics Research Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:249157-A; 249158)
- 48406601 Street, R.; Serdy, F.; Conkin, R.; et al. (1979) Ninety-Day Subacute Toxicity Test with Aminomethylphosphonic Acid CP 50435 in Rats. Project Number: R/D/274, MSL/0951, IR/78/174. Unpublished study prepared by International Research and Development Corp. and Monsanto Corp. 139 p.

## 82-2 21-day dermal-rabbit/rat

### MRID

### Citation Reference

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- 40556 Hamilton, W.J. (1973) Report to Monsanto Company: 21-Day Subacute Dermal Toxicity Study with Mon-2139 in Male Albino Rabbits: IBT No. A2468. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-I)
- 67045 Rausina, G.; Richter, W.R. (1972) Report to ...: 21-Day Subacute Dermal Toxicity Study with MON 2139 in Albino Rabbits: IBT No. A1549. (Unpublished study received Jan 30, 1973 under 524- 308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto

Co., Washington, D.C.; CDL:008460-Q)

- 72353 Hamilton, W.J.; Fischer, C.A. (1973) Report to Monsanto Company: 21-day Subacute Dermal Toxicity Study with MON-2139 in Male Albino Rabbits: IBT No. A2468. (Unpublished study, including sponsor's validation report dated Jun 15, 1978 and letters dated Nov 16, 1977 and Jun 9, 1978 from G.L. Wesp and R.L. Roudabush, respectively, to George J. Levinskas, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234146-I)

### 82-3 90-day dermal-rodent

#### MRID

#### Citation Reference

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- 67046 Hamilton, W.J.; Richter, W.R. (1973) Report to ...: 21-Day Subacute Dermal Toxicity Study with Six Samples in Male Albino Rabbits: IBT No. A2144. (Unpublished study received Jan 30, 1973 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:008460-R)
- 98460 Johnson, D.E.; Nair, K.P.C.; Riley, J.H.; et al. (1982) 21-day Dermal Toxicity Study in Rabbits: 401-168; Monsanto No. IR-81- 195. (Unpublished study received Apr 12, 1982 under 524-308; prepared by International Research and Development Corp., submitted by Monsanto Co., Washington, D.C.; CDL:247228-A)
- 108156 Hamilton, W. (1973) Report to Monsanto Co.: 21-day Subacute Dermal Toxicity Study with MON-0139 and MON-0011 in Albino Rabbits: IBT No. 601-02468. (Unpublished study received Jun 21, 1977 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Agricultural Products Co., St. Louis, MO; CDL:096192-C)

### 82-4 90-day inhal.-rat

#### MRID

#### Citation Reference

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- 30496 Current, F.R.; Carder, M.; Sullivan, D.J.; et al. (1979) Report to Monsanto Company: 90-Day Subacute Aerosol Inhalation Toxicity Study with Roundup Formulation (Lot No. QD31600) in Rats: IBT No. 663-06290. (Unpublished study including letter dated Jan 23, 1980 from M.S. Weinberg to F.C. Meyer and addendum, received Mar 17, 1980 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:242067-A)
- 30497 Horath, L.L. (1975) Report to Monsanto Company: 30-Day Pilot Aerosol Inhalation Toxicity Study with Roundup Formulation (Lot No. QD-31600) in Rats: IBT No. 663-06290. (Unpublished study including letter dated Jan 23, 1980 from M.S. Weinberg to F.C. Meyer, addendum and letter, appendix I, dated Nov 19, 1979 from R.W. Street to F.C. Meyer, received Mar 17, 1980 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:242066-A)

### 82-5 Subchronic Neurotoxicity: 90-Day Study



| MRID                         | Citation Reference  |
|------------------------------|---|
| 54494                        | Fletcher, D.; Arceo, R.J. (1976) Report to Monsanto Company: Neurotoxicity Study with Roundup in Chickens: IBT No. 8580-09117. (Unpublished study received 1976 under 524-EX-29; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229184-A)   |
| <b>83-1 Chronic Toxicity</b> |   |
| MRID                         | Citation Reference  |
| 57074                        | Killeen, J.C., Jr.; Rinehart, W.E.; Stein, R.A.; et al. (1977) An Eighteen Month Oral Toxicity Study of CP 76100 in Hamsters-- Status Report: Project No. 76-1401. (Unpublished study including letter dated Apr 27, 1976 from L.F. Rubin to Bio/Dynamics, and letter dated Nov 11, 1976 from L.F. Rubin to Bio/Dynamics, received May 12, 1977 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229785-G) |
| 62507                        | Reyna, M.S.; Richter, W.R.; Gordon, D.E. (1974) Report to ...: Two- Year Chronic Oral Toxicity Study with CP67573 in Albino Rats: IBT No. B564. (Unpublished study, including sponsor's validation reports dated Dec 15, 1977 and Feb 14, 1978, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL: 234131-G)  |
| 62510                        | Mastalski, K.; Fischer, C.A. (1975) Report to ...: Two-Year Chronic Oral Toxicity Study with CP 67573 in Beagle Dogs: IBT No. 651- 00565. (Unpublished study, including sponsor's validation report dated Dec 16, 1977 and letter dated Apr 6, 1978 from D.W. Fassett to George J. Levinskas, received Jun 21, 1978 under 524- 308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234132-I)        |
| 64766                        | Keplinger, M.L. (1977) Letter sent to Fred Johannsen dated Mar 25, 1977: Glyphosate (CP 67573). (Unpublished study received Apr 1, 1977 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229216-A)   |
| 93879                        | Lankas, G.R.; Hogan, G.K. (1981) A Lifetime Feeding Study of Glyphosate (Roundup(R) Technical) in Rats: Project No. 77- 2062. (Unpublished study received Jan 20, 1982 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:246617-A; 246618; 246619; 246620; 246621)  |
| 105164                       | Burnett, P.; Borders, J.; Kush, J.; et al. (1979) Report to Monsanto Company: Two Year Chronic Oral Toxicity Study with CP- 76100 in Albino Rats: IBT No. 8560-08924. (Unpublished study received Jun 24, 1982 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:247746-A; 247745; 247747; 247748; 247749; 247750; 247751; 247752)  |
| 105954                       | Jenkins, D.; Harris, D.; Knoff, J.; et al. (1979) Report to Monsanto Company: Two-year Chronic Oral Toxicity Study with CP 76100 in Beagle Dogs: IBT No. 8580-08922. (Unpublished study received Jun 24, 1982 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:247753-A)   |
| 114113                       | Hogan, G.; Rinehart, W.; Huber, K.; et al. (1979) A Twelve Month Oral Toxicity Study of CP 76100 in Hamsters: Project No. 76- 1401. Final rept. (Unpublished study received Aug 25,   |

- 1982 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:248232-A)
- 124131 Hogan, G.; Rinehart, W.; Killeen, J.; et al. (1979) A Twelve Month Oral Toxicity Study of CP 76100 in Hamsters: Project No. 76- 1401. Final rept. (Unpublished study received Dec 27, 1982 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:249161-A; 249162; 249163)
- 150564 McConnell, R. (1985) A Chronic Feeding Study of Glyphosate (Roundup Technical in Mice): Pathology Report on Additional Kidney Sec- tions: Addendum to Final Report Dated July 21, 1983: Project No. 77-2061A. Unpublished study prepared by Bio/dynamics Inc. 59 p.
- 153374 Reyna, M. (1985) Twelve Month Study of Glyphosate Administered by Gelatin Capsule to Beagle Dogs: Project No. ML-83-137: Study No. 830116. Unpublished study prepared by Monsanto Company Environ- mental Health. 317 p.
- 153376 Armstrong, T., comp. (1985) A Chronic Feeding Study of Glyphosate Additional Histopathological Evaluations [on Mice]: R.D. No. 643. Unpublished study prepared by Monsanto Agricultural Products Co. 30 p.
- 162912 Ruecker, F. (1986) Addendum to One-year Toxicology Study in Dogs with Glyphosate: Special Report MSL-5927. Unpublished addendum prepared by Monsanto Agricultural Co. 6 p.

### 83-2 Oncogenicity

| MRID   | Citation Reference   |
|--------|--|
| 61113  | Reyna, M.S.; Gordon, D.E. (1973) Report to ...: 18-Month Carcino- genic Study with CP67573 in Swiss White Mice: IBT No. B569. (Unpublished study, including sponsor's validation report dated Feb 1, 1978, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234136-G) |
| 124882 | Monsanto Co. (1983) An Addendum to a Lifetime Feeding Study of Glyphosate (Roundup Technical) in Rats, BDN-77-416: Special Re- port MSL-2009. (Compilation; unpublished study received Jan 27, 1983 under 524-308; CDL:249367-A)   |
| 130406 | Knezevich, A.; Hogan, G. (1983) A Chronic Feeding Study of Glyphosate (Roundup Technical) in Mice: Project No. 77-2061: BDN-77- 420. Final rept. (Unpublished study received Aug 17, 1983 un- der 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, DC; CDL:251007-A; 251008; 251009; 251010; 251011; 251012; 251013; 251014)    |

### 83-3 Teratogenicity -- 2 Species

| MRID  | Citation Reference  |
|-------|---|
| 30494 | Ladd, R.; Smith, P.S. (1977) Report to Monsanto Company: Teratogenic Study with CP 76100-2 in Albino Rabbits: IBT No. 8580-08921. (Unpublished study including letter dated |

- Feb 13, 1978 from H.F. Smyth Jr. to George J. Levinskas and letter dated Feb 13, 1978 from G.L. Wesp to George J. Levinskas, received Mar 17, 1980 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:242064-A)
- 40559 Ladd, R. (1972) Report to Monsanto Company: Teratogenic Study with CP67573 in Albino Rats: IBT No. J568. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-M)
- 46362 Rodwell, D.E.; Tasker, E.J.; Blair, A.M.; et al. (1980) Teratology Study in Rats: IRDC No. 401-054. (Unpublished study including IRDC no. 999-021; received May 23, 1980 under 524-308; prepared by International Research and Development Corp., submitted by Monsanto Co., Washington, D.C.; CDL:242516-A)
- 46363 Rodwell, D.E.; Tasker, E.J.; Blair, M.; et al. (1980) Teratology Study in Rabbits: IRDC No. 401-056. (Unpublished study received May 23, 1980 under 524-308; prepared by International Research and Development Corp., submitted by Monsanto Co., Washington, D.C.; CDL:242516-B)
- 57073 Ladd, R.; Smith, P.S. (1977) Report to Monsanto Company: Teratogenic Study with CP 76100-2 in Albino Rabbits: IBT No. 8580-08921. (Unpublished study received May 12, 1977 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229785-F)
- 68925 Ladd, R.; Smith, P.S. (1974) Report to ...: Teratogenic Study with CP 67573 in Albino Rabbits: IBT No. 651-05275. (Unpublished study, including sponsor's audit report dated Feb 14, 1978 and letter dated Jun 8, 1978 from R.L. Roudabush to George J. Levinskas, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234155-A)

### 83-4 2-generation repro.-rat

| MRID   | Citation Reference   |
|--------|--|
| 62511  | Haley, S. (1972) Final Report to ...: Three-Generation Reproduction Study with CP 67573 in Albino Rats: IBT No. B566. (Unpublished study, including sponsor's validation report dated Feb 7, 1978 and letter dated Feb 23, 1978 from H.F. Smyth, Jr. to George J. Levinskas, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234133-B) |
| 81674  | Schroeder, R.E.; Hogan, G.K. (1981) A Three-generation Reproduction Study with Glyphosate in Rats: Project No. 77-2063. (Unpublished study received Sep 22, 1981 under 524-308; prepared by Bio/dynamics, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:245909-A)   |
| 105163 | Pugliese, T.; Salamon, C.; Smith, S.; et al. (1978) Report to Monsanto Company: Three-generation Reproduction Study with CP 76100 in Albino Rats: IBT No. 8533-08923. Final rept. (Unpublished study received Jun 24, 1982 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:247743-A; 247744)   |

- 105995 Street, R. (1982) Letter sent to R. Taylor dated Jul 6, 1982: Roundup herbicide: Addendum to pathology report for a three- generation reproduction study in rats with glyphosate. (Unpublished study received Jul 7, 1982 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:247793-A)

### 83-5 Dietary: Combined Chronic Toxicity/Oncogenicity Studies

| MRID     | Citation Reference   |
|----------|--|
| 41643801 | Stout, L.; Ruecker, F. (1990) Chronic Study of Glyphosate Administered in Feed to Albino Rats: Lab Project Number: MSL-10495: R.D. 1014. Unpublished study prepared by Monsanto Agricultural Co. 2175 p. |

### 84-2 Interaction with Gonadal DNA

| MRID  | Citation Reference  |
|-------|---|
| 30280 | Salamon, C.; Smith, S. (1978) Report to Monsanto Company: Dominant Lethal Study with CP 76100 in Albino Mice: IBT No. 8533-08920. (Unpublished study received Mar 17, 1980 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:242055-A)  |
| 46364 | Rodwell, D.E.; Wrenn, J.M.; Blair, A.M.; et al. (1980) Dominant Lethal Study in Mice: IRDC No. 401-064. (Unpublished study received May 23, 1980 under 524-308; prepared by International Research and Development Corp., submitted by Monsanto Co., Washington, D.C.; CDL:242516-C)  |
| 52579 | Arnold, D. (1972) Report to Monsanto Company: Mutagenic Study with CP67573 in Albino Mice: IBT No. E567. (Unpublished study received on unknown date under 4G1444; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:093847-L)   |
| 57071 | Brusick, D. (1976) Mutagenicity Evaluation of Bio-76-116; CP-76100, Lot T-701: LBI Project No. 2547. Final rept. (Unpublished study received May 12, 1977 under 524-308; prepared by Litton Bionetics, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229785-D)   |
| 57072 | Salamon, C.; Smith, S. (1977) Report to Monsanto Company: Dominant Lethal Study with CP 76100 in Albino Mice: IBT No. 8533-08920. (Unpublished study received May 12, 1977 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:229785-E)  |
| 61601 | Salamon, C.; Smith, S. (1975) Report to ...: Host-Mediated Assay for Detection of Mutations Induced by CP 67573 (Test Species: Albino Rats and Mice): IBT No. 623-07508. (Unpublished study, including sponsor's audit report dated Feb 13, 1978 and letter dated Feb 23, 1978 from H.F. Smyth, Jr. to George J. Levinskas, received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234163-A) |

- 78619 Shirasu, Y.; Moriya, M.; Ohta, T. (1978) Microbial Mutagenicity Testing on CP67573 (Glyphosate). (Unpublished study received Apr 25, 1979 under 524-308; prepared by Institute of Environmental Toxicology, Japan, submitted by Monsanto Co., Washington, D.C.; CDL:238233-A)
- 78620 Kier, L.D.; Flowers, L.J.; Hannah, L.H. (1978) Final Report on Salmonella Mutagenicity Assay of Glyphosate: Test No. LF-78-161. (Unpublished study received Apr 25, 1979 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:238233-B)
- 79524 Baskin, A.D. (1976) Report to ...: Recombination Assay of CP 67573 Using Two Genotypes of *Bacillus subtilis* Confirmed with Two Genotypes of *Escherichia coli*: IBT No. 633-07801. (Unpublished study received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:234161-A)
- 105047 Kennedy, G.L. (1976) Report to Monsanto Company: Reverse Mutation Studies with CP 67573 in Five *Salmonella* Strains and One *Saccharomyces* Strain: IBT No. 633-07507. (Unpublished study received on unknown date under unknown admin. no.; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, D.C.; CDL:247092-A)
- 132681 Li, A.; Kier, L.; Folk, R. (1983) CHO/HGPRT Gene Mutation Assay with Glyphosate: EHL Study No. ML-83-155. Final rept. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-B)
- 132682 Li, A.; Dirks, R. (1983) In vivo Bone Marrow Cytogenetics Study of Glyphosate in Sprague-Dawley Rats; Effects of Glyphosate on Rat Bone Marrow Cells: Study Nos. 830083; 830082. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-C)
- 132683 Li, A.; Kier, L.; Folk, R. (1983) In vivo Bone Marrow Cytogenetics Study of Glyphosate in Sprague-Dawley Rats: Study No. 830083. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-D)
- 132684 Li, A.; Kier, L.; Folk, R. (1983) Effects of Glyphosate on Rat Bone Marrow Cells: EHL Study No. 830082. Final rept. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-E)
- 132686 Williams, G.; Tong, C.; Dirks, R.; et al. (1983) The Hepatocyte Primary Culture/DNA Repair Assay on Compound JN-1020 Using Rat Hepatocytes in Culture: NDI/In vitro Facility Experimental No. 083183A; Sponsor Order No. AH-83-181. (Unpublished study received Nov 15, 1983 under 524-308; prepared by Naylor Dana Institute for Disease Prevention, submitted by Monsanto Co., Washington, DC; CDL:251737-G)
- 137640 Li, A.; Kier, T.; Folk, R. (1984) Amendment to CHO/HGPRT Mutagenicity Study: ? Glyphosate]: Special Report MSL-3224. (Unpublished study received Feb 21, 1984 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:252487-A)

## 85-1 General metabolism

| MRID   | Citation Reference  |
|--------|---|
| 108188 | Sutherland, M.; Banduhn, M.; Frazier, H. (1978) Metabolism of N-Nitrosophosphonomethylglycine in the Laboratory Rat: Report No. MSL-0242. Final rept. |

- (Unpublished study received May 16, 1978 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:233913-A)
- 132680 Kier, L.; Li, A. (1983) Glyphosate Mutagenicity Studies: Overall Assessment: ?Summary of Genotoxic Data]. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-A)
- 132685 Ridley, W.; Dietrich, M.; Folk, R.; et al. (1983) A Study of the Plasma and Bone Marrow Levels of Glyphosate following Intraperitoneal Administration in the Rat: Study No. 830109. (Unpublished study received Nov 15, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251737-F)
- 137139 Maibach, H. (1982) (Toxicity: 14C-glyphosate in Monkeys). (Unpublished study received Jan 5, 1984 under 524-308; prepared by Univ. of California--San Francisco, School of Medicine, submitted by Monsanto Co., Washington, DC; CDL:252142-C)
- 137140 Franz, T. (1983) Evaluation of the Percutaneous Absorption of Roundup Formulations in Man Using an in vitro Technique: Monsanto Study No. UW-81-346. Final rept. (Unpublished study received Jan 5, 1984 under 524-308; prepared by Univ. of Washington, School of Medicine, submitted by Monsanto Co., Washington, DC; CDL:252142-D)

#### 86-1 Domestic animal safety

| MRID   | Citation Reference  |
|--------|---|
| 111951 | Fletcher, D. (1974) Report to ...: Toxicity and Reproduction Study with 75% CP 67573 XHB-87 and 25% CP 50435 XHD-115 in White Leg- horn Chickens: IBT No. 651-03917. (Unpublished study received Jun 21, 1978 under 524-308; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Monsanto Co., Washington, DC; CDL:234149-A) |

#### 121-1 Phytotoxicity

| MRID  | Citation Reference  |
|-------|---|
| 18126 | Serdy, F.S.; Armstrng ?sic], ?; Phillips, ?; et al. (1976) Compa- rability Data Summary: Roundup + Lasso + Atrazine vs. Lasso + Atrazine: Annual Weed Control. (Unpublished study including letter dated Jul 9, 1976 from F.S. Serdy to Robert J. Taylor and experiment nos. 99, 208, 1587..., received Jul 13, 1976 under 524-308; submitted by Monsanto Co., St. Louis, Mo.; CDL: 225330-A) |
| 23347 | Graham, ?; Serdy, ?; Reynolds, ?; et al. (1976) Summary and Con- clusions. (Unpublished study received Dec 19, 1977 under 524- 308; submitted by Monsanto Co., Washington, D.C.; CDL:232518-F)  |
| 24505 | Wu, ?; Meyer, ?; Nethertn (sic), ?; et al. (1976) Effectiveness Data. (Unpublished study received Jan 16, 1978 under 524-285; prepared in cooperation with Michigan State Univ. and others, submitted by Monsanto Co., Washington, D.C.; CDL:232680-D)  |
| 27295 | MONSANTO CO. (1975) SUMMARY AND CONCLUSION: EFFICACY DATA. UN- PUBLISHED STUDY. 126 P.  |

- 27365 Sprankle, P.L. (1974) Factors Affecting the Herbicidal Activity of N-(Phosphonomethyl) Glycine (Glyphosate) on Quackgrass *Agropyron repens* (L.) Beauv. and in the Soil. Doctoral dissertation, Michigan State Univ., Dept. of Crop and Soil Sciences. (Unpublished study received Jul 12, 1974 under 5F1536; submitted by Monsanto Co., Washington, D.C.; CDL: 094179-A)
- 32498 Serdy, ?; Ryn, K.; Benson, ?; et al. (1976) Summary and Conclusion: Efficacy Data. (Unpublished study received on unknown date under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:224430-A)
- 39941 Henshall, A.; Brightwell, B.B.; Marvel, J.T. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 5: Soil Binding and Phytotoxicity of Mon-0573 and Its Metabolites on Soils: Agricultural Research Report No. 274. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Chemical Co., Washington, D.C.; CDL:095790-B)
- 72208 Yates, W.E.; Akesson, N.B.; Bayer, D.E. (1978) Drift of glyphosate sprays applied with aerial and ground equipment. *Weed Science* 26(6):597-604. (Also~In~unpublished submission received May 22, 1979 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:238527-G)
- 77301 Monsanto Company (1975) Residue Results. (Compilation; unpublished study, including published data, received Mar 11, 1976 under 524-308; CDL:095141-A)
- 101142 Monsanto Co. (1977) Grape Efficacy with Roundup. (Compilation; unpublished study received Jun 19, 1978 under 524-308; CDL: 097145-A)
- 108114 Monsanto Co. (1975) Full Reports and Data of Investigation Made on the Effectiveness of the Product: ?Roundup Herbicide|. (Compilation; unpublished study received Jun 10, 1975 under 524-308; CDL:094173-A)
- 108130 Monsanto Co. (1976) ?Efficacy of Roundup in Apple Orchards|. (Compilation; unpublished study received Sep 7, 1976 under 524-308; CDL:095270-A)
- 108131 Monsanto Co. (1976) Summary and Conclusions: ?Round-up and Other Herbicides|. (Unpublished study received Dec 8, 1976 under 524-308; CDL:095635-B)
- 108141 Monsanto Co. (1975) Efficacy Summary: ?Roundup|. (Compilation; unpublished study received Mar 11, 1976 under 524-308; CDL: 096181-A)
- 108142 Monsanto Co. (1977) ?Effectiveness of CP-70139 to Control Pests on Cotton and Other Crops|. (Compilation; unpublished study received Jun 21, 1977 under 524-308; CDL:096189-A)
- 108143 Monsanto Co. (1977) Summary and Conclusions: ?CP 70139|. (Compilation; unpublished study received Jun 21, 1977 under 524-308; CDL:096190-A)
- 108145 Monsanto Co. (1977) Summary and Conclusions: ?Roundup as Herbicide for Asparagus|. (Compilation; unpublished study received Feb 14, 1978 under 524-EX-44; CDL:096821-B)
- 108146 Monsanto Co. (1978) Effectiveness Data: ?Roundup Results on Forage Grasses & Legumes|. (Compilation; unpublished study received May 9, 1978 under 524-308; CDL:097094-A)
- 108148 Monsanto Co. (1977) Summary of Efficacy Data--Vegetable Crops. (Compilation; unpublished study received Oct 25, 1977 under 524-308; CDL:096399-A)
- 108150 Monsanto Co. (1977) Summary and Conclusions: ?Roundup on Avocado Production|. (Compilation; unpublished study received Nov 15, 1977 under 524-308; CDL:096631-B)

- 108163 Monsanto Co. (1978) Efficacy: ?Glyphosate and Other Herbicides|. (Compilation; unpublished study received Jun 30, 1978 under 524-308; CDL:097166-A)
- 108164 Monsanto Co. (1978) Efficacy--Avocado: ?Roundup Herbicide|. (Com- pilation; unpublished study received Jul 14, 1978 under 524-308; CDL:097213-A)
- 108165 Monsanto Co. (1977) ?Efficacy of Roundup on Sugarcane|. (Com- pilation; unpublished study received Jul 28, 1978 under 524-308; CDL:097255-A)
- 108170 Monsanto Co. (1977) ?Efficacy of Herbicides on Stone Fruits|. (Compilation; unpublished study received Dec 13, 1978 under 524-308; CDL:097736-B)
- 108206 Monsanto Co. (1978) Efficacy Data: ?Roundup on Cotton & Soybeans|. (Compilation; unpublished study received Jul 27, 1978 under 524-308; CDL:234517-B)
- 108226 Monsanto Co. (1979) ?Herbicidal Efficacy of Roundup on Cotton and Soybeans|. (Compilation; unpublished study received on unknown date under 524-308; CDL:238526-A)
- 111946 Monsanto Co. (1976) Summary and Conclusions: ?Tests with Roundup Herbicide as a Pre-plant Treatment for Alfalfa|. (Compilation; unpublished study received Jan 11, 1977 under 524-308; CDL: 095705-A)
- 124066 Monsanto Co. (1975) Efficacy: ?Roundup|. (Compilation; unpublished study received Mar 11, 1976 under 524-308; CDL:095140-A)
- 129546 Interregional Research Project No. 4 (1983) The Results of Tests on the Amount of Residues Remaining in on ?Kiwifruit| Including a Description of the Analytical Method Used; ? Glyphosate|. (Compilation; unpublished study received Jul 21, 1983 under 3E2929; CDL:071750-A)
- 140009 Billman, ?; Andrews, ?; Tucker, D.P.H.; et al. (1975) Summary of Roundup Performance in Grapefruit Groves. (Unpublished study including published data, received Jan 26, 1976 under 524-308; prepared in cooperation with Univ. of Florida, Agricultural Research and Education Center at Lake Alfred and others, sub- mitted by Monsanto Co., Washington, D.C.; CDL:094959-B)

## 122-1 Seed Germination/Seedling Emergence and Vegetable Vigor

### MRID

### Citation Reference

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- 40159301 Bohm, J. (1987) An Evaluation of the Preemergence Herbicidal Ac- tivity of CP-70139: Lab Project ID: 056337. Unpublished study prepared by Monsanto Agricultural Co. 25 p.

## 123-2 Aquatic plant growth

### MRID

### Citation Reference

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- 40236901 Hughes, J. (1987) The Toxicity of Glyphosate Technical to Selenas- trum capricornutum: Lab Project ID: 1092-02-1100-1. Unpublish- ed study prepared by Malcolm Pirnie, Inc. 23 p.



- 40236902 Hughes, J. (1987) The Toxicity of Glyphosate Technical to *Navicula pelliculosa*: Lab Project ID: 1092-02-1100-2. Unpublished study prepared by Malcolm Pirnie, Inc. 23 p.
- 40236903 Hughes, J. (1987) The Toxicity of Glyphosate Technical to *Skeletonema costatum*: Lab Project ID: 1092-02-1100-3. Unpublished study prepared by Malcolm Pirnie, Inc. 24 p.
- 40236904 Hughes, J. (1987) The Toxicity of Glyphosate Technical to *Anabaena flos-aquae*: Lab Project ID: 1092-02-1100-4. Unpublished study prepared by Malcolm Pirnie, Inc. 23 p.
- 40236905 Hughes, J. (1987) The Toxicity of Glyphosate Technical to *Lemna gibba*: Lab Project ID: 1092-02-1100-5. Unpublished study prepared by Malcolm Pirnie, Inc. 22 p.

## 151-26 Physical and Chemical Properties

| MRID  | Citation Reference   |
|-------|--|
| 64643 | Danhaus, R.G.; Dubelman, S. (1980) Residues of Alachlor, Chloramben, and Glyphosate in Sunflower Seed following Preemergent Applications of Lasso <sup>®</sup> I Alone, or in Tank Mix Combinations with Amiben <sup>®</sup> I and Roundup <sup>®</sup> I: Report No. MSL-1314. Final rept. (Unpublished study received Nov 20, 1980 under 524-285; submitted by Monsanto Co., Washington, D.C.; CDL:243785-A) |

## 153-4C Magnitude of the Residue [by commodity]

| MRID  | Citation Reference   |
|-------|--|
| 64643 | Danhaus, R.G.; Dubelman, S. (1980) Residues of Alachlor, Chloramben, and Glyphosate in Sunflower Seed following Preemergent Applications of Lasso <sup>®</sup> I Alone, or in Tank Mix Combinations with Amiben <sup>®</sup> I and Roundup <sup>®</sup> I: Report No. MSL-1314. Final rept. (Unpublished study received Nov 20, 1980 under 524-285; submitted by Monsanto Co., Washington, D.C.; CDL:243785-A) |

## 161-1 Hydrolysis

| MRID   | Citation Reference   |
|--------|--|
| 41829  | Rueppel, M.L.; Brightwell, B.B.; Darlington, W.A. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 2: The Photolysis, Run-Off, and Leaching of Mon-0573 on or in Soil: Agricultural Research Report No. 258. (Unpublished study received on unknown date under 4G1444; submitted by Monsanto Co., Washington, D.C.; CDL:093846-C) |
| 108187 | Sutherland, M.; Banduhn, M.; Frazier, H. (1977) Environmental Impact Studies on N-Nitroso-n-phosphonomethylglycine: Report No. 467. Final rept. (Unpublished study received Sep 16, 1977; Sep 19, 1977 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:231886-A)   |

**161-2 Photodegradation-water**

| <b>MRID</b> | <b>Citation Reference</b>  |
|-------------|--|
| 41689101    | Castle, S.; Ruzo, L.; Kathryn, S. (1990) Degradation Study: Photo- Degradation of ?Carbon 14  Glyphosate in a Buffered Aqueous Solution at pH 5, 7 and 9 by Natural Sunlight: Lab Project Number: 233W-1: 233W: 1020. Unpublished study prepared by Pharmacology and Toxicology Research Laboratory, Inc. 105 p. |

**161-3 Photodegradation-soil**

| <b>MRID</b> | <b>Citation Reference</b>   |
|-------------|---|
| 38907       | Monsanto Company (1973) ?Residue Data for Roundup in Soil . (Un- published study received Jan 31, 1977 under 524-308; CDL: 095786-J)  |
| 108181      | Rueppel, M.; Brightwell, B.; Marvel, J.; et al. (1972) Final Report on MON-0573, Residue and Metabolism: Part 3. The Degradation and Metabolism of MON-0573 in Soil: Agricultural Research Report No. 269. (Unpublished study received Jan 30, 1973 under unknown admin. no.; submitted by Monsanto Co., Washington, DC; CDL: 120303-D) |

**162-1 Aerobic soil metabolism**

| <b>MRID</b> | <b>Citation Reference</b>   |
|-------------|---|
| 38907       | Monsanto Company (1973) ?Residue Data for Roundup in Soil . (Un- published study received Jan 31, 1977 under 524-308; CDL: 095786-J)  |
| 76493       | Sprankle, P.; Penner, D.; Meggitt, W.F. (1973) Adsorption and Deg- radation of Glyphosate in the Soil. (Unpublished study received Nov 9, 1973 under 524-308; submitted by Monsanto Co., Washing- ton, D.C.; CDL:120640-E)  |
| 108181      | Rueppel, M.; Brightwell, B.; Marvel, J.; et al. (1972) Final Report on MON-0573, Residue and Metabolism: Part 3. The Degradation and Metabolism of MON-0573 in Soil: Agricultural Research Report No. 269. (Unpublished study received Jan 30, 1973 under unknown admin. no.; submitted by Monsanto Co., Washington, DC; CDL: 120303-D) |
| 108184      | Sprankle, P.; Penner, D.; Meggitt, W. (1973) Adsorption and Degra- dation of Glyphosate in the Soil. (Unpublished study received Nov 9, 1973 under 524-308; submitted by Monsanto Co., Washing- ton, DC; CDL:120373-A)  |
| 41742901    | Kesterson, A.; Atkins, R. (1991) Aerobic Metabolism ?carbon 14  Glyphosate in Sandy Loam and Silt Loam Soils with Biometer Flask Lab Project Number: 1301: 368. Unpublished study prepared by PTRL East, Inc. 111 p.  |

**162-3 Anaerobic aquatic metab.**

| MRID     | Citation Reference  |
|----------|---|
| 108187   | Sutherland, M.; Banduhn, M.; Frazier, H. (1977) Environmental Impact Studies on N-Nitroso-n-phosphonomethylglycine: Report No. 467. Final rept. (Unpublished study received Sep 16, 1977; Sep 19, 1977 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:231886-A)                              |
| 108192   | Brightwell, B.; Malik, J. (1978) Solubility, Volatility, Adsorption and Partition Coefficients, Leaching and Aquatic Metabolism of MON 0573 and MON 0101: Report No. MSL-0207. Final rept. (Unpublished study received Jun 12, 1978 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:234108-A) |
| 108232   | Banduhn, M.; Frazier, H. (1978) (Inert Ingredient) Surfactant: Biodegradation in Natural Waters: Report No. MSL-0488. (Unpublished study received Sep 13, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:241017-A)  |
| 41723701 | Kesterson, A.; Jackson, S. (1990) Anaerobic Aquatic Metabolism of <sup>14</sup> C Carbon 14 Glyphosate: Lab Project Number: 1304: 367. Unpublished study prepared by PTRL East, Inc. 78 p.  |

#### 162-4 Aerobic aquatic metab.

| MRID     | Citation Reference   |
|----------|--|
| 41723601 | Kesterson, A.; Jackson, S. (1990) Aerobic Aquatic Metabolism of <sup>14</sup> C Carbon 14 Glyphosate: Lab Project Number: 1300: 366. Unpublished study prepared by PTRL East, Inc. 60 p. |

#### 163-1 Leach/adsorp/desorption

| MRID  | Citation Reference  |
|-------|---|
| 23339 | Monsanto Company (19??) The Soil Dissipation of Glyphosate, Alachlor, Atrazine and Simazine Herbicides. (Unpublished study received Dec 19, 1977 under 524-308; CDL:232518-E)   |
| 23979 | Monsanto Company (19??) The Soil Dissipation of Glyphosate, Alachlor and Simazine Herbicides. (Unpublished study received Dec 19, 1977 under 524-285; CDL:232519-F)   |
| 27365 | Sprankle, P.L. (1974) Factors Affecting the Herbicidal Activity of N-(Phosphonomethyl) Glycine (Glyphosate) on Quackgrass <i>Agropyron repens</i> (L.) Beauv. and in the Soil. Doctoral dissertation, Michigan State Univ., Dept. of Crop and Soil Sciences. (Unpublished study received Jul 12, 1974 under 5F1536; submitted by Monsanto Co., Washington, D.C.; CDL: 094179-A) |
| 30654 | Monsanto Company (19??) The Soil Dissipation of Glyphosate, Alachlor and Metribuzin Mixtures. (Unpublished study received Jan 16, 1978 under 524-285; CDL:232680-E)   |
| 37690 | Monsanto Company (19??) Soil Dissipation of Roundup <sup>®</sup> I, Lasso <sup>®</sup> I and Cyanazine Herbicides. (Unpublished study received Apr 18, 1979 under 524-285; CDL:238167-E)  |

- 39932 Lauer, R.; Briggs, L.M.; Lottman, C.M.; et al. (1974) Laboratory Dissipation Study of Roundup in Soils. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095788-E)
- 39938 Rueppel, M.L.; Brightwell, B.B.; Darlington, W.A. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 2: The Photolysis, Run-off, and Leaching of Mon-0573 on or in Soil: Agricultural Research Report No. 258. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095789-C)
- 39940 Rueppel, M.L.; Brightwell, B.B.; Henshall, A.; et al. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 4: The Rate of Dissipation of Mon-0573 in Soil: Agricultural Research Report No. 271. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095790-A)
- 39941 Henshall, A.; Brightwell, B.B.; Marvel, J.T. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 5: Soil Binding and Phytotoxicity of Mon-0573 and Its Metabolites on Soils: Agricultural Research Report No. 274. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Chemical Co., Washington, D.C.; CDL:095790-B)
- 39943 Henshall, A.; Brightwell, B.B.; Marvel, J.T. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 7: Run-Off of Mon-0573 from Inclined Soil Beds: Agricultural Research Report No. 275. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095790-D)
- 41829 Rueppel, M.L.; Brightwell, B.B.; Darlington, W.A. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 2: The Photolysis, Run-Off, and Leaching of Mon-0573 on or in Soil: Agricultural Research Report No. 258. (Unpublished study received on unknown date under 4G1444; submitted by Monsanto Co., Washington, D.C.; CDL:093846-C)
- 61558 Monsanto Company (1972) Metabolism of Glyphosate in Sugarcane and Soils. (Unpublished study received Mar 11, 1976 under 524-308; CDL:095141-D)
- 64703 Lauer, R.; Arras, D.D.; Dubelman, S. (1980) Soil Dissipation of Glyphosate following Multiple Applications under Laboratory Conditions: Report No. MSL-1173. Final report. Includes undated method entitled: Analytical residue method for N-Phosphonomethylglycine and aminomethylphosphonic acid in soil. (Unpublished study received Dec 16, 1980 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:099816-B)
- 72806 Henshall, A.; Brightwell, B.B.; Marvel, J.T. (1972) Final Report on Mon-0573, Residue and Metabolism: Part 7: Run-Off of Mon-0573 From Inclined Soil Beds: Agricultural Research Report No. 275. (Unpublished study received on unknown date under 4G1444; submitted by Monsanto Co., Washington, D.C.; CDL:093846-H)
- 76493 Sprankle, P.; Penner, D.; Meggitt, W.F. (1973) Adsorption and Degradation of Glyphosate in the Soil. (Unpublished study received Nov 9, 1973 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:120640-E)
- 108157 Monsanto Agricultural Products Co. (1974) Glyphosate Residues in Soil following Recirculating Sprayer Treatments with Glyphosate to Cotton and Soybeans. (Unpublished study received Jun 21, 1977 under 7F1971; CDL:096192-E)
- 108184 Sprankle, P.; Penner, D.; Meggitt, W. (1973) Adsorption and Degradation of Glyphosate in the Soil. (Unpublished study received Nov 9, 1973 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:120373-A)
- 108187 Sutherland, M.; Banduhn, M.; Frazier, H. (1977) Environmental Impact Studies on N-

Nitroso-n-phosphonomethylglycine: Report No. 467. Final rept. (Unpublished study received Sep 16, 1977; Sep 19, 1977 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:231886-A)

- 108192 Brightwell, B.; Malik, J. (1978) Solubility, Volatility, Adsorption and Partition Coefficients, Leaching and Aquatic Metabolism of MON 0573 and MON 0101: Report No. MSL-0207. Final rept. (Unpublished study received Jun 12, 1978 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:234108-A)

### 164-1 Terrestrial field dissipation

| MRID   | Citation Reference  |
|--------|---|
| 27118  | Hall, J.K. (1974) Erosional losses of Triazine herbicides. Journal of Environmental Quality 3(2):174-180. (Also unpublished submission received Jul 19, 1978 under 201-403; submitted by Shell Chemical Co., Washington, D.C.; CDL:234475-O)  |
| 38907  | Monsanto Company (1973) ?Residue Data for Roundup in Soil. (Unpublished study received Jan 31, 1977 under 524-308; CDL: 095786-J)   |
| 38908  | Beasley, R.K.; Daniels, R.J.; Lauer, R.; et al. (1974) Final Report on CP 67573, Residue and Metabolism--Part 17: Determination of Crop Residues in Corn, Wheat, Soybeans, Small Grains, Soil and Water: Agricultural Research Report No. 325. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095787-B) |
| 39380  | Conkin, R.A.; Hannah, L.H.; Stewart, E.R. (1975) Summary of Glyphosate Environmental Impact Studies (PR 70-15). (Unpublished study received Sep 26, 1975 under 6H5106; submitted by Monsanto Co., Washington, D.C.; CDL:094900-F)   |
| 39381  | Kramer, R.M.; Arras, D.D.; Beasley, R.K.; et al. (1975) Final Report on CP 67573 Residue and Metabolism: Agricultural Research Report No. 372. (Unpublished study received Sep 25, 1975 under 6G1679; prepared in cooperation with Washington State Univ. and others, submitted by Monsanto Co., Washington, D.C.; CDL: 095355-A)                                 |
| 77301  | Monsanto Company (1975) Residue Results. (Compilation; unpublished study, including published data, received Mar 11, 1976 under 524-308; CDL:095141-A)  |
| 108132 | Cowell, J.; Lottman, C.; Cable, M.; et al. (1976) Determination of Roundup Herbicide Residues in Raisins: Report No. 440. Final rept. (Unpublished study received Jan 11, 1977 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:095703-A)  |
| 108182 | Rueppel, M.; Brightwell, B.; Henshall, A.; et al. (1972) Final Report on MON-0573, Residue and Metabolism: Part 4. The Rate of Dissipation of MON-0573 in Soil: Agricultural Research Report No. 271. (Unpublished study received Jan 30, 1973 under unknown admin. no.; submitted by Monsanto Co., Washington, DC; CDL: 120303-E)                                |
| 108230 | Beasley, R.; Conkin, R.; Danhaus, R.; et al. (1978) Dissipation of Glyphosate in Field Soil Experiments. (Unpublished study received May 22, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:238528-E)   |
| 128710 | Allan, J.; Klein, A.; Campbell, D.; et al. (1983) Additional Information To Support the Registration of Roundup Herbicide: Forest Ecosystem Study: Special Report MSL-1820.   |

- (Unpublished study received Jun 22, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:250513-A)
- 162910 Danhaus, R. (1983) Dissipation of Glyphosate in U.S. Field Soils following Direct Application of Roundup Herbicide: Report No. MSL-3210. Unpublished study prepared by Monsanto Agricultural Co. 178 p.
- 162922 Danhaus, R. (1984) Dissipation of Glyphosate in U.S. Field Soils following Multiple Applications of Roundup Herbicide: Rept. No. MSL-3352. Unpublished study prepared by Monsanto Agricultural Co. 114 p.
- 162923 Allan, J.; Klein, A. (1983) Roundup Herbicide Dissipation in Cool Climate Forest Soil and Leaf Litter: Rept. No. MSL-2950. Unpublished study prepared by Monsanto Agricultural Co. 92 p.
- 42963401 Oppenhuizen, M.; Goure, W. (1993) The Terrestrial Field Dissipation of Glyphosate in Canadian Soil: Lab Project Number: MSL-12605: 91-63-R-2. Unpublished study prepared by Monsanto 248 p.

### 164-2 Aquatic field dissipation

| MRID   | Citation Reference   |
|--------|--|
| 36227  | Demint, R.J.; Frank, P.A.; Comes, R.D. (1970) Amitrole residues and rate of dissipation in irrigation water. <i>Weed Science</i> 18(4): 439-442. (Also in unpublished submission received Sep 25, 1975 under 6G1679; submitted by Monsanto Co., Washington, D.C.; CDL: 095356-F)   |
| 39381  | Kramer, R.M.; Arras, D.D.; Beasley, R.K.; et al. (1975) Final Report on CP 67573 Residue and Metabolism: Agricultural Research Report No. 372. (Unpublished study received Sep 25, 1975 under 6G1679; prepared in cooperation with Washington State Univ. and others, submitted by Monsanto Co., Washington, D.C.; CDL: 095355-A)                |
| 101561 | Kramer, R.; Blackburn, R. (1974) Glyphosate Dissipation--Pond Test. (Unpublished study received May 17, 1982 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:070863-A)   |
| 108136 | Evans, J.; Duseja, D. (1973) Herbicide Contamination of Surface Runoff Waters. By Utah State Univ. for U.S. Environmental Protection Agency, Office of Research and Monitoring. ?S.l.: s.n.l. (EPA-R2-73-266; available from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; published study; CDL:095793-F) |
| 108173 | Monsanto Co. (1978) Residue Studies for Use of Roundup Herbicide in Aquatic Situations. (Compilation; unpublished study received Dec 27, 1978 under 524-308; CDL:097760-A; 097761; 097762)   |
| 108232 | Banduhn, M.; Frazier, H. (1978) (Inert Ingredient) Surfactant: Biodegradation in Natural Waters: Report No. MSL-0488. (Unpublished study received Sep 13, 1979 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:241017-A)   |

### 164-3 Forest field dissipation

| MRID   | Citation Reference   |
|--------|--|
| 134008 | Danhaus, R.; Lottman, C.; Newton, M.; et al. (1983) Roundup Herbicide Forest Ecosystem Study; Part III: Residues of Glyphosate, Amino-phosphonic Acid and N-nitrosoglyphosate in Small Mammals and Fish from a Forest Watershed after Aerial Application of Roundup Herbicide: Project No. 7163; Report No. MSL-3128. (Unpublished study received Nov 30, 1983 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:251868-A) |

**164-5 Long term soil dissipation**

| MRID   | Citation Reference  |
|--------|---|
| 162922 | Danhaus, R. (1984) Dissipation of Glyphosate in U.S. Field Soils following Multiple Applications of Roundup Herbicide: Rept. No. MSL-3352. Unpublished study prepared by Monsanto Agricultural Co. 114 p. |

**165-0 Accumulation Studies -- General**

| MRID   | Citation Reference   |
|--------|--|
| 93922  | Danhaus, R.G.; Lottman, C.M.; Steinmetz, J.R.; et al. (1979) Roundup <sup>(R)</sup> I Forest Ecosystem: Part II: Residues of Glyphosate, Aminomethylphosphonic Acid and N-Nitrosoglyphosate in Forest Foliage and Litter and on Mylar Spray Interceptors, following Aerial Application of Roundup <sup>(R)</sup> I Herbicide: MSL-1974. (Unpublished study received Jan 27, 1982 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:246658-A) |
| 108173 | Monsanto Co. (1978) Residue Studies for Use of Roundup Herbicide in Aquatic Situations. (Compilation; unpublished study received Dec 27, 1978 under 524-308; CDL:097760-A; 097761; 097762)   |

**165-3 Accumulation - irrig crop**

| MRID     | Citation Reference  |
|----------|---|
| 40541305 | Kunstman, J. (1988) Volume 5: Irrigated Crops Study--Determination of Glyphosate Residues in Crops, Irrigation Water, Sediment, and Soil following Treatment of Irrigation Source with Rodeo: Laboratory Project No. MSL-7633. Unpublished study prepared by Monsanto Agricultural Co. 203 p. |

**171-5 Reduction of residues**

| MRID | Citation Reference |
|------|--------------------|
|------|--------------------|

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77301 Monsanto Company (1975) Residue Results. (Compilation; unpublished study, including published data, received Mar 11, 1976 under 524-308; CDL:095141-A)

#### 171-4B Residue Analytical Methods

| MRID  | Citation Reference  |
|-------|---|
| 28853 | Monsanto Company (19??) Analytical Residue Method for N-(Phosphono- methyl) glycine, Aminomethylphosphonic acid and N-Nitroso-N- (phosphonomethyl) glycine in Peanuts. (Unpublished study re- ceived Feb 22, 1980 under 524-308; CDL:099306-B)  |
| 28854 | Monsanto Company (19??) Two Column Switching HPLC Ninhydrin Post- Column Reactor System. Undated method. (Unpublished study re- ceived Feb 22, 1980 under 524-308; CDL:099306-C)  |
| 28855 | Monsanto Company (19??) Analytical Residue Method for N-Phosphono- methylglycine ?sic  and Aminomethylphosphonic acid in Peanuts, Hay and Nuts. (Unpublished study received Feb 22, 1980 under 524-308; CDL:099306-D)   |
| 36223 | Monsanto Company (1974) Analytical Residue Method for N-Phosphono- methyl glycine and Aminomethylphosphonic acid in Forage and Grain. Method B dated Mar 1, 1974. (Unpublished study received Sep 25, 1975 under 6G1679; CDL:095356-B)  |
| 37688 | Monsanto Company (1979) Analytical Residue Method for N-Phosphono- methyl Glycine, Aminomethylphosphonic acid and N-Nitrosogly- phosate in Field Corn Forage, Fodder and Grain. Method dated Jan 22, 1979. (Unpublished study received Apr 18, 1979 under 524-285; CDL:238167-C)  |
| 39140 | Monsanto Company (1966?) Analytical Residue Method for N-Phosphono- methylglycine and Aminomethylphosphonic acid in Citrus Juice, Peel, and Process Fractions. (Unpublished study received Jan 26, 1976 under 524-308; CDL:094958-A)  |
| 39928 | Monsanto Company (1964?) Determination of N-Phosphonomethyl glycine (CP 67573) and its Major Metabolite Aminomethylphosphonic acid (CP 50435) in Forage and Grain. Undated method A. (Unpublished study received Jan 31, 1977 under 524-308; CDL:095788-A)  |
| 39930 | Monsanto Company (1966?) Analytical Residue Method for N-Phosphono- methyl glycine and Aminomethylphosphonic acid in Forage and Grain. Undated method B. (Unpublished study received Jan 31, 1977 under 524-308; CDL:095788-C)  |
| 39933 | Beasley, R.K.; Lauer, R.; Daniels, R.J.; et al. (1973) Roundup Res- idue Method Development for Crops, Soil and Water. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095788-F)   |
| 39934 | Rogers, P.E.; Kramer, R.M. (1974) Final Report on the Esterifica- tion of the N- Trifluoroacetyl Derivatives of CP 67573 and CP 50435 for Use in Residue Assays: Agricultural Research Report No. 324. (Unpublished study received Jan 31, 1977 under 524-308; submitted by Monsanto Co., Washington, D.C.; CDL:095788-G) |
| 51982 | Monsanto Company (1976) Analytical Residue Method for N-Phosphono- methylglycine and Aminomethylphosphonic acid in Green Coffee Beans. Method dated May 1, 1976. (Unpublished study received Jun 3, 1976 under 524-308; CDL:096177-F)   |



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#### 171-4C Magnitude of the Residue [by commodity]

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**81-5 Primary dermal irritation**

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- 44057207 Blaszcak, D. (1996) Closed-Patch Repeated Insult Dermal Sensitization Study in Guinea Pigs (Buehler Method) with MON 77360: Final Report: Lab Project Number: 96-1433: HU-96-1433: 1351. Unpublished study prepared by Huntingdon Life Sciences. 29 p.

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| MRID | Citation Reference |
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| 43824302 | Lurvey, E. (1995) Glyphosate: Magnitude of Residue on Pineapple, Hawaii: Lab Project Number: 96-20-11. Unpublished study prepared by Hawaiian Sugar Planters Assoc. 74 p.  |
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| <b>MRID</b> | <b>Citation Reference</b> |
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- 44560500 Monsanto Company (1998) Submission of Reduced-Risk Pesticide Rationale for Glyphosate. Transmittal of 1 Study.
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