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United States General Accounting Office
Washington, DC 20548

January 8, 2003

The Honorable Charles H. Taylor
House of Representatives

Subject: *Drug Control: Coca Cultivation and Eradication Estimates in Colombia*

Dear Mr. Taylor:

Colombia is the world's leading producer and distributor of cocaine and a significant supplier of heroin to the United States. According to the Department of State, Colombia provides about 90 percent of the cocaine entering the United States and approximately two-thirds of the heroin found on the East Coast. A key objective of the U.S. counternarcotics strategy is to assist Colombia in its efforts to reduce the amount of illicit drug crops being cultivated in the country. Under the Department of State's Bureau for International Narcotics and Law Enforcement Affairs, the Office of Aviation supports the Colombian National Police's efforts to eradicate coca and opium poppy through aerial eradication.[1]

In March 2002, the Executive Office of the President, Office of National Drug Control Policy (ONDCP), reported that coca cultivation in Colombia increased by 25 percent between 2000 and 2001—from 136,200 hectares[2] to 169,800 hectares—despite Colombian eradication efforts. These estimates were prepared by the U.S. Director of Central Intelligence, Crime and Narcotics Center (CNC).[3] However, U.S. Embassy in Bogotá officials questioned the reported increase, noting that the number of hectares of coca the Office of Aviation estimated eradicated in 2001 had increased substantially over previous years.[4] As the result of earlier concerns about the coca cultivation estimates in Colombia, in November 2001, ONDCP had initiated an evaluation of CNC and the Office of Aviation methodologies for estimating coca

[1]The leaves of the coca plant are the raw ingredient of cocaine and opium poppy is used to produce heroin. The plants are sprayed from low-flying airplanes with an herbicide that attacks the root system.

[2]A hectare is 2.47 acres.

[3]CNC's estimates are presented in its report titled *Latin American Narcotics Cultivation and Production, Estimates 2001* (Washington, D.C.: March 2002).

[4]At about the same time, the government of Colombia's coca cultivation estimate for the same period showed a net decrease of 11 percent. The Colombian government numbers are from the United Nations' Drug Control Program's report *Colombia: Annual Coca Cultivation Survey 2001* (Bogotá: March 2002).

cultivation and eradication, respectively. ONDCP completed its study in June 2002 and made a number of recommendations to improve both estimates.

In your letter to us, you noted the differing coca estimates for Colombia. In subsequent discussions with your staff, we agreed to determine the (1) purposes of CNC's coca cultivation estimate and the Office of Aviation's coca eradication estimate in Colombia and (2) status of actions to implement the ONDCP study's recommendations. To address these objectives, we reviewed relevant documentation and met with cognizant officials from ONDCP, CNC, and the Office of Aviation.

Results in Brief

The coca cultivation estimate prepared by CNC and the coca eradication estimate prepared the Office of Aviation in Colombia serve different purposes and cannot be readily reconciled to one another because of differences in their respective methodologies.

- Annually, CNC develops cultivation estimates for coca, opium poppy, and marijuana in drug-producing countries around the world. These are published each March as part of the President's determination whether to continue providing U.S. assistance to major drug-producing and -transit countries. To prepare its estimates, CNC analyzes black and white high-resolution photographs taken primarily from satellites covering a representative sample of the target country's known or suspected drug-growing areas. This allows CNC to estimate illicit drug cultivation for the entire country. In Colombia, these images are usually taken, weather permitting, between November and January of each year. Because these cultivation estimates are used by other U.S. government agencies to help determine the amount of illicit drugs available for consumption in the United States, CNC focuses on identifying fields of healthy coca plants with leaves that are suitable for processing into cocaine.

- As part of its support for the Colombian National Police, the Office of Aviation uses airborne digital cameras to photograph coca fields for targeting aerial spraying and, afterwards, to help estimate the number of hectares eradicated. Through computer analysis, the Office of Aviation analyzes the light reflecting off the vegetation to identify coca. The digital photos can be taken anytime weather permits and are targeted over areas where the Colombian National Police intends to conduct or has conducted aerial eradication operations. Also, because the Office of Aviation wants to identify any coca fields for aerial eradication, it includes coca seedlings and mature, damaged, and dead plants in its definition of a coca field.

The June 2002 ONDCP study recommended, among other things, that CNC and the Office of Aviation reconcile their definitions of a coca field, develop an error rate for each estimate, and enhance the technologies used for developing the respective estimates. Both CNC and Office of Aviation officials said they are in the process of implementing many of these recommendations, though the Office of Aviation said

that some would require additional funding. CNC noted that it would have many of the changes necessary completed in time for its 2002 coca cultivation estimate. As a result of CNC's and the Office of Aviation's continuing efforts to address ONDCP's concerns, we are not making any recommendations at this time.

Background

Recognizing the seriousness of illegal drug activities in Colombia, the Colombian government, in October 1999, announced a $7.5 billion counternarcotics plan known as Plan Colombia. Among other things, Plan Colombia proposed to reduce the cultivation, processing, and distribution of illicit narcotics by 50 percent over 6 years. Achieving this goal included undertaking a substantially increased aerial eradication program in the primary coca-growing regions of Colombia. In July 2000, the United States provided about $1.3 billion to Colombia, other Andean countries, and U.S. agencies involved in drug interdiction and law enforcement. In fiscal year 2002, the United States provided Colombia more than $550 million for counternarcotics-related activities; for fiscal year 2003, the administration has requested about $670 million in additional assistance to address many of these same purposes.

With the large infusions of counternarcotics funding into Colombia, officials at the U.S. Embassy in Bogotá expected to demonstrate progress in reducing the amount of coca being cultivated in Colombia. However, as the following table indicates, CNC's 2001 estimate showed an increase in coca cultivation of almost 25 percent.[5] As noted by the embassy, the CNC estimated increase occurred despite the number of hectares estimated eradicated (per year) increasing substantially in 2001 compared with recent prior years.

Table: Hectares of Coca Estimated under Cultivation and Eradicated in Colombia, 1998-2001

Year	Crime and Narcotics Center		Office of Aviation
	Hectares under cultivation	Percent increase	Hectares eradicated
1998	101,800	28	49,641
1999	122,500	20	39,113
2000	136,200	11	42,283
2001	169,800	25	77,165

Source: CNC figures are from its report titled *Latin American Narcotics Cultivation and Production, Estimates 2001* (Washington, D.C.: March 2002). The Office of Aviation figures were provided by its headquarters office at Patrick Air Force Base, Florida.

[5]According to CNC, slightly more than 33 percent of the increase was the addition of a growing area not previously included. The increase in the "traditional" growing areas was 16 percent.

In March 2002, the U.S. Embassy in Bogotá stated that the CNC estimates were "very wide of the mark and the apparent result of years of chronic underestimation of the amount of coca being cultivated in Colombia."[6] According to the embassy, CNC did not account for significant aerial eradication operations that occurred in southern Colombia during late 2001.[7] CNC officials said that CNC alerted its customers that the 2001 annual estimate did not reflect the eradication activity. In addition, when CNC's coca cultivation estimates for Colombia were publicly released, ONDCP noted that any coca killed by aerial eradication operations conducted after CNC's satellite imagery was taken was not accounted for.[8]

Purposes of Coca Cultivation and Eradication Estimates

CNC and the Office of Aviation have very different purposes in developing their respective estimates for coca cultivation and eradication. CNC's primary purpose is to determine how much coca, on an annual basis, is available for processing into cocaine. The Office of Aviation's primary purpose is to identify coca fields for aerial eradication and then to assess the effectiveness of the spray operations. The technologies used reflect these differences. CNC obtains most of its information through satellites and uses a random sampling technique to estimate coca cultivation countrywide. The Office of Aviation uses aircraft mounted multi-spectral[9] digital cameras to photograph designated areas suspected of coca cultivation.

CNC's Coca Cultivation Estimates

The Foreign Assistance Act of 1961, as amended, requires that for major drug-producing and -transit countries to receive U.S. assistance, the President must annually certify that they are cooperating with the United States to reduce the production and flow of illegal drugs into the United States.[10] In March of each year, as part of the certification process, the State Department publishes the *International Narcotics Control Strategy Report* that describes the major drug-producing and -transit countries' counternarcotics efforts and, among other things, reports the amount of illicit narcotics being cultivated based on CNC estimates.

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[6]U.S. Embassy, Bogotá cable 2020, March 4, 2002.

[7]CNC officials noted, however, that CNC had concluded that coca cultivation in southern Colombia was reduced 22 percent by aerial eradication operations that took place the prior year between December 19, 2000, and February 5, 2001.

[8]According to Office of Aviation officials, it may take 45 days or more for coca plants to show the effects of aerial eradication. Most of the imagery CNC analyzed for its 2001 estimate was taken before or less than 45 days after the major aerial eradication effort in southern Colombia and would not likely have shown the effects of the spraying.

[9]The multi-spectral cameras the Office of Aviation uses allow it to examine three different light-band settings.

[10]22 U.S.C. 2291j. Alternatively, the President may certify that vital U.S. national interests require that assistance be provided.

CNC has been involved in estimating crop cultivation for more than 30 years. In the late 1960s, it began developing imagery-based statistical techniques that, by the 1970s, were used to estimate grain production in the Soviet Union. In 1985, CNC began using these techniques to estimate coca cultivation and, by 1990, it used them to develop worldwide illicit crop estimates. CNC's annual cultivation estimates are designed to provide U.S. decision makers an estimate of the amount of illicit drugs being cultivated worldwide and serve as the basis for estimating the amount of illicit narcotics available for consumption in the United States. CNC's estimates are not designed to quantify or account for activities such as eradication or replanting that may take place throughout the year.

In preparing its Colombian estimate, CNC develops a statistical sample of known and suspected coca-growing areas. CNC relies primarily on high-resolution satellite imagery of these areas, but also uses commercial satellite imagery and aerial photographs. CNC selects targets to analyze based on prior history and information from other sources, including the Office of Aviation and the Department of Defense. The satellite imagery is black and white photographs that are usually taken, weather permitting, in November through January each year to allow time for them to be analyzed and the results incorporated into the annual March report. Because CNC's coca cultivation estimates are used to help determine the amount of cocaine available for consumption in the United States, CNC focuses on identifying healthy coca plants with leaves that are suitable for harvesting and processing into cocaine.

The Office of Aviation's Coca Eradication Estimates

Under Section 481 of the Foreign Assistance Act of 1961, as amended,[11] the State Department provides assistance to various drug-producing and -transit countries to support their efforts in reducing drug-trafficking, production, and related activities. As part of this assistance, the Office of Aviation has supported the Colombian National Police in conducting aerial eradication missions since 1995.

In 1998, the Office of Aviation began using two airborne multi-spectral high-resolution digital cameras to photograph and locate coca fields in Colombia. Through sophisticated computer analysis of the light reflecting off the ground vegetation, the Office of Aviation is able to identify suspected coca fields for planning spray missions. After the fields have been sprayed, the targeted areas are often photographed again to help the Office of Aviation estimate how much of the coca has been eradicated.[12] The Office of Aviation also applies an effectiveness factor or "kill rate" to the fields sprayed to estimate how much coca was eradicated.[13] In identifying

[11]22 U.S.C. 2291.

[12]Selected fields are also visually examined either by flying low over the field in helicopters or, occasionally, by landing and more closely inspecting the plants.

[13]Based on prior experience, the Office of Aviation estimates that 87 percent of the coca sprayed eventually dies, but the ONDCP team questioned this effectiveness factor.

coca fields, the Office of Aviation includes coca seedlings, mature coca, coca that may be dying or dead because of spray operations, and unkempt coca (fields of irregular size and shape not neatly maintained).

The ONDCP Study

In November 2001, ONDCP initiated an evaluation of CNC's methodology for estimating coca cultivation and the Office of Aviation's methodology for identifying coca fields and estimating the amount of coca being eradicated through its aerial eradication program. ONDCP completed its study in June 2002 and made numerous recommendations to improve the estimates developed by CNC and the Office of Aviation.[14]

As reported in the ONDCP study, CNC compared its analysis of coca fields in a predefined area of southern Colombia with the Office of Aviation's analysis of the same area. The results highlighted the dramatic differences in the two approaches. Out of 764 coca fields in the designated area, CNC and the Office of Aviation differed on the identification of 603 of the fields or about 79 percent. The discrepancy was largely based on differences in definition of what should be counted as a coca field. According to the ONDCP team, the CNC definition was "very conservative" and only classified a field as coca "when the field is active and contains only coca." According to the team, this likely led to undercounting. The Office of Aviation used a "liberal" definition of coca fields that includes coca seedlings and mature plants, as well as coca that is damaged or dead. As a result, the team concluded that the Office of Aviation tended to overcount coca.

The ONDCP team also reported that neither CNC nor the Office of Aviation had adopted a statistically rigorous accuracy assessment, commonly known as an error rate, for their respective methodologies. Based on available data, the ONDCP team could not determine the statistical accuracy associated with either the cultivation or eradication estimates.

Additionally, the ONDCP team reported that the technologies used by CNC and the Office of Aviation were insufficient for the purposes they were being used. For example, CNC's technology does not allow it to account for image distortions or changes in terrain and the atmosphere,[15] and the Office of Aviation's technology does not allow it to accurately account for not only coca that may be present, but also other vegetation that, according to the ONDCP team, should be separately identified.

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[14]ONDCP contracted with four experts in imagery and remote sensing. For purposes of this report, we refer to them as the ONDCP team. Its final report was titled *Methodological and Technological Evaluation – Assessing Coca Cultivation and Eradication Impact in Colombia (Putumayo Region)* (Washington, D.C.: June 11, 2002).

[15]CNC pointed out that the distortions do not present too much of a problem when the images are visually interpreted. However, CNC is upgrading its technology to correct for these distortions in 2002 as it moves toward a digital imaging system.

The ONDCP team made nearly 20 recommendations to improve the estimates developed by CNC and the Office of Aviation. Overall, the team recommended that CNC and the Office of Aviation

- agree on definitions of what constitutes a coca field and the various types of other vegetation that may be present,
- conduct quantitative accuracy assessments, and
- improve their respective methodologies to take advantage of state-of-the-art advancements in the respective technologies used.

According to CNC and Office of Aviation officials, many of the recommendations are in the process of being implemented. CNC officials told us they plan to implement all of the recommendations pertaining to CNC and have contracted with one of the ONDCP team members to help. CNC expects to have many of the recommended changes in place for its 2002 analysis (for release in March 2003). Officials from the Office of Aviation said some of the recommendations pertaining to it would probably not be fully implemented in the foreseeable future because of insufficient funding. For example, upgrading its technology to identify more types of vegetation will not be undertaken at this time because of the expense involved. A meeting between CNC and Office of Aviation officials to discuss recommendations affecting both organizations—such as coca field definitions—is planned for early 2003.[16]

Agency Comments

The Department of State provided written comments on a draft of this report (see appendix). State noted that we provide a useful description of the differences and limitations of measuring aspects of illegal drug cultivation in Colombia. State also commented that this is an extremely important issue that directly affects U.S. drug policies, programs, and budgets. It went on to elaborate on some of the limitations associated with estimating coca cultivation and production.

In addition, ONDCP, CNC, and Office of Aviation officials provided technical comments that we have incorporated into this report, as appropriate.

Scope and Methodology

To determine the purposes of the Colombian coca estimates prepared by CNC and the Office of Aviation and the status of the ONDCP team's recommendations, we reviewed relevant documentation and met with cognizant officials at ONDCP and CNC in Washington, D.C., and at the Office of Aviation headquarters at Patrick Air Force Base, Florida. In connection with other work, we also traveled to Colombia

[16]An October 2002 meeting was canceled because of scheduling conflicts.

and discussed the coca cultivation and eradication estimates with the Narcotics Affairs Section at the U.S. Embassy in Bogotá.

Our review was conducted from April through December 2002 in accordance with generally accepted government auditing standards.

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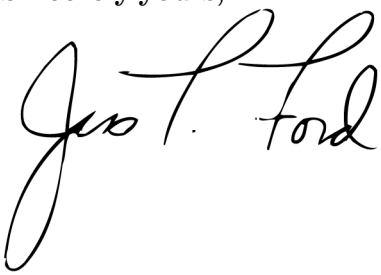
We are sending copies of this report to appropriate congressional committees, the Secretary of State, the Director of Central Intelligence, and the Director of ONDCP. We will also make copies available to others upon request. In addition, this report will be available at no charge on our Web site at http://www.gao.gov.

If you or your staff have any questions concerning this report, please contact me at (202) 512-4268 or Al Huntington, Assistant Director, at (202) 512-4140. Other key contributors to this report were Allen Fleener and Ronald Hughes.

Sincerely yours,



Jess T. Ford, Director
International Affairs and Trade

Comments From the Department of State

United States Department of State

Washington, D.C. 20520

JAN - 6 2003

Dear Ms. Westin:

We appreciate the opportunity to review your draft report, "DRUG CONTROL: Coca Cultivation and Eradication Estimates in Columbia," GAO-03-319R, GAO Job Code 320115.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Rogers Woolfolk, Aviation Advisor, Office of Aviation, Bureau of International Narcotics and Law at (202) 776-8704.

Sincerely,

Christopher B. Burnham
Assistant Secretary and
Chief Financial Officer

Enclosure:

As stated.

cc: GAO/IAT - Al Huntington
State/OIG - Mr. Berman
State/INL/LP - Mr. Thomas Martin

Ms. Susan S. Westin,
Managing Director,
International Affairs and Trade,
U.S. General Accounting Office.

Department of State Comments on GAO Draft Report

DRUG CONTROL: Coca Cultivation and Eradication Estimates in Colombia (GAO-03-319R, GAO Code 320115)

The Department of State considered the GAO report "Drug Control: Coca Cultivation and Eradication Estimates in Colombia" a useful evaluation of the differences and limitations among the different mechanisms measuring aspects of illegal drug cultivation in Colombia. This is an extremely important issue for the Department of State, one that directly affects US drug policies, programs and budgets. We appreciate the opportunity to comment on this report.

The Department of State notes that the annual CNC coca cultivation and cocaine potential production estimates are often considered the official yearly benchmark for US counter-drug programs. As noted in the report, the CNC data collection method does not allow analysis based on the condition of the coca plant - whether it is dying because of spray or newly replanted following eradication.

The health of the coca plant and whether it has been recently replanted are significant distinctions. Eradicated fields that are not replanted represent a permanent full production loss. Those sprayed fields that are replanted also suffer major yearly production losses. Mature coca fields are capable of roughly 4 to 5 harvests a year (depending on type of coca plant and local climate). Fields replanted with 1-yr-old seedlings can, at best, be harvested at the end of 9 to 12 months - producing only about 20 percent of a full harvest during its first year. Fields that are reseeded will take up to 2 years to yield their first coca leaf harvest. As calculated, the CNC estimates of coca cultivation do not reflect any reduction of productivity of coca which results from replanting of eradicated fields. This in turn could lead to a substantial overestimate of total coca production.

The Colombia spray eradication program is designed to inflict significant economic damage to both the farming and refining segments of the cocaine industry long enough to force both to dramatically reduce cocaine production in the medium term and face bankruptcy in the long term. With the vast spraying undertaken (nearly 130,000 hectares of coca in 2002 and up to 200,000 hectares planned for 2003) eradication has become the single greatest factor in our war against Colombian cocaine.

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We recognize that both coca farmers and the cocaine industry are able and willing to absorb major losses in production for a short period (perhaps for as much as 2-3 years), while still keeping up the area under cultivation and supply the world market with drugs. Until the eradication program operates successfully long enough to exhaust their ability to absorb losses and use up product and financial reserves, it is likely that there will not be significant reduction to the acreage of coca cultivation (which can be replanted almost immediately following successful spray eradication).

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