David B. Sandalow
Executive Vice President

September 27, 2002

The Honorable Joseph B. Biden
United States Senate
221 Russell Senate Building
Washington, D.C. 20510

Dear Senator Biden,

World Wildlife Fund has completed a review of the report the State Department delivered to Congress on September 4, 2002 on the U.S.-supported aerial drug eradication program in Colombia. WWF finds that the health and environmental analyses provided to the Congress do not sufficiently substantiate the conclusion that the chemicals used in the aerial fumigation of coca pose no unreasonable risks or adverse effects to humans or the environment. In the attached document, WWF identifies inadequacies of the analysis presented by the State Department as well as factors which should be assessed in determining the health and environmental safety of the U.S.-supported aerial eradication program in Colombia.

Also attached are questions on this topic that you may wish to raise with the State Department.

I hope you find this information useful. If we can be of further assistance, please let me know.

Sincerely,

David B. Sandalow

Attachment

ATTACHMENT

Under Title II of the Foreign Operations, Export Financing, and Related Programs Appropriation Act 2002 (2002 Foreign Aid Act), Section 481 to support counterdrug activities in the Andean region of South America, states that for the procurement of chemicals for aerial coca fumigation programs may be made available for such programs only if the Secretary of State, after consultation with the Administer of the Environmental Protection Agency, the Secretary of the Department of Agriculture, and if appropriate, the Director of the Centers for Disease Control and Prevention, determines and reports to the Committees on Appropriations that:

(1) aerial coca 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 after consultation with the Colombian government to ensure that the fumigation is in accordance with Colombian laws;

(2) 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; and

(3) 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 coca fumigation is planned, and in the departments in which such aerial coca fumigation has been conducted such programs are being implemented.

EPA Study Methodology

The EPA study has provided an overview and analysis of the potential human health and environmental safety concerns of the aerial application of glyphosate for coca eradication in Colombia. EPA has reviewed information provided by the Department of State, reviewed available scientific studies and information on the human health and environmental effects of glyphosate and the inert ingredients, conducted a literature search of human health incidents related to glyphosate use in the US, and considered information, provided by non-governmental sources, concerning adverse effects reportedly connected to the eradication program.

While the EPA study provides a thorough review of available information, it does not significantly increase our understanding of potential health and environmental risks given the following:

1. The study extrapolates from data and studies in the United States, under conditions that are not necessarily comparable with the type of application being practiced nor environmental conditions found in Colombia. The Agency recognizes this limitation, nevertheless no efforts appear to have been made to address this gap in basic information especially as it relates to tropical species, endangered species and potential surface water contamination due to soil erosion, an important factor in mountainous areas of Colombia.

2. Aerial drift is likely to be a significant factor causing undue exposure to non-target organisms, especially with the use of fixed-wing aircraft, and under the conditions found in Colombia.

3. The human health characterization used to determine the safety of aerial fumigation in Colombia was based on old data. Since 2000 several studies have raised concerns about the sensitivity of previous toxicological and epidemiological studies to test the safety of Roundup.

4. The formulation used in Colombia is registered in the US and Colombia but is not marketed in the US, limiting the availability of information on specific impacts in Colombia. At the very end of the EPA study, it is noted that there are NO scientific investigations on the past or present formulations being used in Colombia.

5. The adjuvant Cosmoflux 411 F is not registered in the US, and given that it has been found that formulations of glyphosate are more toxic than the technical grade product, it is essential that primary data be acquired on the health and environmental risks of this formulation. The Agency acknowledges that they do not have ecological toxicity information on this adjuvant.

Ecological Risk Assessment

The study compares the ecological risk of glyphosate based on regulatory environmental fate studies submitted to the Agency to support the registration of glyphosate salts and their formulated pesticide products. Based on some of the conclusions and other unknowns, a decision of acceptable risk is questionable.

1. There is no risk to non-target birds, mammals and insects given toxicity findings for bobwhite quail, mallard ducks, honeybees and rats. However, information on long-term health effects in wild animal populations, including endangered species is not available nor is there information on effects on reproductive systems. Given there may be effects in human populations, the chronic effects on wildlife would need to be reconsidered, especially under conditions of much higher biological diversity. The study does note however that there may be adverse secondary effects from the temporary loss of habitat in the spray area that could occur, an issue that may be of particular importance for the highly biologically diverse regions of Colombia.

2. The risk to non-target terrestrial plants is likely from exposure to glyphosate as a result of its use especially related to spray drift, and modeling indicates the possibility that 50% of neighboring plants could be affected by spray drift from 150 to 600 feet downwind from the area sprayed. While the study is careful to note that there are a number of assumptions that can affect the predictability of the model's results, there are other factors at least in some regions of coca cultivation that would limit the value of the analysis to assess potential impacts of spray drift. First, some of the coca areas may be flat, but they are rarely with uniform vegetation. Poppy is grown in mountainous areas with diverse vegetation types. Second, DoS does not provide

information on droplet size, which is one of the most important factors in predicting drift, but the study notes that application by fixed wing aircraft would likely further reduce the droplet size. While atmospheric conditions can be controlled by canceling missions if wind speeds are beyond 10mph, relative humidity above 75% and temperatures above 90%, missions would be almost impossible given that RH is generally between 82% and 93% in the areas being fumigated based on data from Putumayo Basin land use plan (OAS web page www.oas.org). Third, application is done at an altitude of 100 feet or less. This may be rather difficult if coca fields are interspersed with primary tropical forests, which in the lowlands have an average canopy height of 30 meters (98 feet). Finally, the study notes that DoS reports that the coca eradication program selects experienced applicators. This assumes that experience is equivalent with good practice, which is not always the case. For example, a recent disaster in the US demonstrates that even with government supervision, drift and the damage from drift cannot be estimated. A BLM designed and managed effort to spray a herbicide on government land to eradicate a noxious weed, drifted onto 100,000 acres across 11 counties and left the land barren forcing farmers in the region to search for rental land in distant areas to raise their crops (Hand, 2002).

3. Aquatic systems. Manufacturers explicitly recommend limiting direct application to water bodies. Under the conditions found in Colombia, and given the abundance of hydrological resources, it would be impossible to avoid direct application, which may affect fish and aquatic invertebrates. No assessments on the rich fish diversity found in the Amazon rivers and streams have been carried out.

4. Risks to amphibian species. Colombia has more frog species than any other country in the world, and it is known that frogs can absorb chemical contaminants directly through dermal exposure, thus the dietary exposure as cited in the text of the EPA study would not be the most relevant. In the case of Plan Colombia, amphibians will be exposed through inhalation, ingestion, and dermal sorption. Only a few studies using various formulations of glyphosate and assorted anuran species found effects from 100% mortality to delayed mortality as well as depressed growth, abnormal avoidance response, and paralysis (Mann and Bidwell, 1999; Smith, 2001; Berrill, Bertram, and Pauli, 1997).

5. Microbiological and nutrient cycling in tropical soils. No studies were found that studied the effects of glyphosate on tropical soils. However, it has been demonstrated to inhibit the activity of nitrogen fixing enzymes and thus may interfere in nutrient cycling (Eberbach and Douglas, 1983; Eberbach and Douglas, 1989; Martensson, 1992; Moorman et al, 1992; Santos and Flores, 1995; Tenuta and Beauchamp, 1995). The EPA study states, however, that this is not a standard component of the Agency's risk assessment.

Health Risks

The health implications of these more sensitive new studies need to be considered before arriving at the conclusion that there are no long-term health problems associated with exposure to Roundup. First, Walsh *et al* (2000) reported that Roundup inhibited the production of progesterone in the Leydig cells of mouse testicles. These cells play a crucial role in the testicles because they produce the male hormone, testosterone. In these cells, progesterone is a precursor hormone in the production of testosterone. If one were to look at the testicles in a man after exposure to glyphosate there would be no signs of toxicity. However, in the long term, reduced testosterone levels in the testicles can lead to fertility problems in adult males, and in the fetus can lead to abnormal development of the male reproductive tract and male behavior. It is impossible to measure effects like these at the molecular level in exposed individuals at the time of exposure, nor would the individual know that he or she has been affected. And since the effects may not be manifested until puberty or adulthood, making a causal link with Roundup exposure would be difficult.

Dariuch *et al* (2001) using reagent grade Roundup, discovered that it inhibited a particular enzyme in tissue from the liver, heart, and brain of pregnant rats. This enzyme makes it possible for the conversion of cholesterol to pregnenolone, which like progesterone, is also a precursor to the production of estrogen, testosterone and other critical hormones required for normal development. The animals exposed to Roundup also experienced significant weight loss as the result of reduced water and food consumption. The authors expressed concern for the functional development of the progeny of pregnant women exposed to pesticides, including Roundup. If a pregnant woman were exposed to Roundup she would have no way of knowing if her unborn child had been affected.

Garry *et al* (2002) in a 1989-1991 epidemiological study demonstrated a significantly higher frequency of birth defects among children in the Red River Valley, Minnesota than other regions of the state. In a cross-sectional study of 695 families and 1,532 children from the original Red River Valley cohort eight years later, Garry *et al* revealed a significant correlation with excess adverse birth defects, a 3.6 fold greater odds of neurodevelopmental effects (OR of 3.6; CI, 1.3 to 9.6), and a tentative association between attention deficit hyperactivity disorder (ADD/ADHD) in children born of farmers who applied Roundup. Evidence of human damage such as this would never be detected in Colombia where admittedly in the State Department report the Roundup is being applied in the poorest department in the country and where there is little access to health care. The exposure to Roundup in the Minnesota study was in all probability lower than what is planned for Colombia. Better shelter, prior notification, and general knowledge in the US that one does not stand outside when pesticides are being aerially applied would also contribute to the difference.

As in Minnesota, a number of other pesticides are being applied to coca crops. The ingredients that are included in the formulation of pesticides to enhance their efficacy have also been demonstrated to add to their toxicity. The proprietary formulation of Cosmoflux adds to the complexity of exposure and should therefore be accounted for as an increased risk. The cumulative and aggregate exposure of repeated applications of other pesticides (insecticides, fungicides, etc.), including Roundup, increase the chances for totally unpredictable interactive

health effects. This would be similar to the acknowledged added risk every time a new medication is added to a patient's drug regimen. The growing number of long-term delayed effects resulting from the fumigation of Viet Nam also provide an example of delayed expression of adverse health endpoints not only in those exposed postnatally, but those who were indirectly exposed in the womb. Second generation effects are now coming to light.

Traditional toxicology has overlooked the long-term health effects on function and development that are not visible at birth. Consequently, results such as those presented above were not taken into consideration by the USEPA or the State Department as they arrived at their conclusions about the safety of Roundup.

Conclusions and Follow-up Questions

Given the above observations, a number of general questions are raised about aerial fumigation programs and the associated health and environmental risks. They include:

Question: What will be done to address the gaps in information on the ecological risks, especially as related to non-target organisms and spray drift, direct and inadvertent application to water bodies, potential effects on nutrient processes in tropical soils, and impact on amphibian species?

Question: In light of these new findings what will be done to remove the infants, children and women of child bearing age from the fields and surrounding areas before the Roundup is applied?

Question: The USEPA and State Department Report note that workers enter the fields immediately after the spraying in order to hand strip the leaves to save what they can of the crop. These people will be exposed through inhalation, dermal sorption, and ingestion. Has this been taken into consideration when estimating human exposure? If not, why not?

Question: What considerations are being given to provide health care and remedial services, and/or to reimburse exposed individuals for the long-term health impacts that will possibly emerge (as demonstrated in the Garry *et al* paper and results from Viet Nam) as a result of exposure to the fumigation effort?

Question: With regards to the requirements for alternative development programs, little information has been provided by DoS. To what extent have alternative development programs been developed? What has been the consultation with local communities and authorities?

Citations

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