INTERNATIONAL COURT OF JUSTICE

CASE CONCERNING

AERIAL HERBICIDE SPRAYING

(ECUADOR v. COLOMBIA)

REJOINDER OF THE REPUBLIC OF COLOMBIA

VOLUME I

1 FEBRUARY 2012

TABLE OF CONTENTS

SUMMARY

Chapter 1

INTRODUCTION AND OVERVIEW

A. General Remarks

1.1. In its *Reply* as in its *Memorial*, Ecuador has portrayed a devastating image of the situation of its northern regions bordering Colombia, allegedly as a result of the drift from aerial spraying operations to eradicate illicit coca crops conducted by Colombia on its own territory between 2000 and 2007. At the same time, Ecuador's *Reply* contains offensive language and makes numerous accusations against Colombia. It is suggested for example that Colombia failed to provide evidence regarding the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate[1] and deliberately misrepresented the facts, including alleged violations of Ecuador's sovereignty and territorial integrity. Colombia vigorously rejects these accusations.

1.2. In fact, Ecuador's written pleadings are largely based on misrepresentations and on witness statements prepared for the purposes of this litigation. In particular, through a careful selection of the documents obtained from the United States Department of State under its Freedom of Information Act ("FOIA") requests, Ecuador attempted to show in its *Reply* that residues of the spray mixture used in the aerial spraying

[1] Hereinafter also referred to as PECIG, for its Spanish acronym.

operations may have been deposited on its territory and may have caused alleged adverse effects on human health and the environment.

1.3. Ecuador seeks to use the spray flight data as evidence of the fact that Colombia did not conform to its own operational requirements and failed to minimize drift. This material is employed in an attempt to corroborate the witness statements produced with the *Memorial*, which remain, with all their imperfections, the core element of Ecuador's case.

1.4. Colombia requested from the United States' Government copies of the entire record furnished to Ecuador pursuant to its FOIA requests and analysed the *Reply* in the light of all these documents, with the collaboration of qualified scientists whose expert reports are attached to this *Rejoinder*.[2] There are several observations to make with regard to Ecuador's treatment of the material acquired under the FOIA requests.

1.5. First, as will be shown in Chapter 2, Ecuador's allegations as to the conduct of the program are not based on an

[2] CR, Vol. II, Annexes: 1, Dr A.J. Hewitt, Ph.D., *Response to Report "Spray Drift Modeling of Conditions of Application for Coca Crops in Colombia by D.K. Giles, Jan. 2011"*, 1 Nov. 2011; 2, Dr A.J. Hewitt, Ph.D., *Aerial Spray Drift Modeling of Plan Colombia Applications*, 1 Nov. 2011; 3, Dr K.R. Solomon, Ph. D., *Expert Report of Keith R. Solomon on Behalf of Colombia*, Nov. 2011; 4, Dr S. Dobson, OBE Ph.D., *Response to scientific papers in Annexes to Volume II of Ecuador's Reply (2011),* Dec. 2011; 5, A. Tait, International Mapping Associates, *Statistical Summary of Data for Spray Events Within the Relevant Area Along the Border between Colombia and Ecuador*, Dec. 2011; 6, Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011.

objective analysis of the data; they contain numerous flaws and unsubstantiated assumptions.

1.6. Second, as explained in Chapter 3, the spray flight data provides no support to the accounts of Ecuador's witnesses. To the contrary, the witness evidence filed by Ecuador remains highly unreliable when compared with the factual and scientific record and with contemporaneous satellite imagery. In many cases, the data shows that there were no sprayings at the times mentioned by the witnesses. Further, as demonstrated by the scientific evidence and the satellite imagery submitted with this *Rejoinder*, even when sprayings did take place in Colombia at the relevant times, there was no spray deposition at all in Ecuador or – if any – it was insignificant.

1.7. Third, Ecuador has produced only a selected fraction of the documents obtained under the FOIA requests and has elected not to file with its *Reply* information in its possession that runs directly contrary to its claims.

1.8. The *Reply* is also based on assumptions that have no basis in reality. A notable example is Ecuador's assumption that the wind would normally be blowing north-south, i.e. from Colombia towards Ecuador, with the result that any drift would be towards Ecuadorian territory. This disregards entirely the meteorological realities; the fact is that the prevailing wind direction in the area is south-north, i.e., from Ecuador towards Colombia.

1.9. Likewise, Ecuador claims that the human rights of Ecuadorian nationals and indigenous communities were violated as a result of the sprayings over illicit coca crops in Colombian territory. However, quite aside from any legal considerations (which will be addressed in Chapter 4 below), Ecuador's claims have not been established as a matter of fact and cannot be reconciled with the scientific evidence which supports the conclusion that the spraying mixture used in the program could not possibly cause the adverse effects on the environment, fauna, flora and human health that Ecuador complains about.

1.10. The fact of the matter is that the spray mixture does not even remotely correspond to the lethal potion described by Ecuador. Glyphosate has been studied extensively, perhaps more than any other herbicide, and its properties are very well-known. Glyphosate and glyphosate-based formulations are used in gardens all over the world for weed control and in the most eco-sensitive environments, to control invasive plants. If Ecuador (and its witnesses) are to be believed and glyphosate could really cause the kind of injury complained of, any harmful effects would have been manifest by now. If glyphosate had such a negative impact on the environment, it would have had devastating effects for the soil fertility and crop yield of millions of hectares of land throughout the planet. There would be a substantial body of scientific evidence documenting such large scale devastation. Glyphosate use would have been banned or severely restricted. None of these consequences have been

experienced in Colombia – yet they are said to have been produced in Ecuador by drift alone.

B. Colombia's Fight Against Drugs

1.11. Colombia has been at the forefront of the global efforts directed at drug eradication and interdiction. Colombia has acted in compliance with its international obligations, and in application of the principle of shared responsibility acknowledged by the international community. Waging this battle is an issue of national security for Colombia, in the defence of its democracy, its institutions and its nationals who have suffered for decades due to the scourge of drug trafficking.

1.12. Given the close connection between drug trafficking and international terrorism, the United Nations and other major international organizations have recognized that a coordinated international response is needed and have repeatedly expressed their concern over this threat.[3] In February 2010, the President of the UN Security Council, Gérard Araud, issued the following statement:

---

[3] Organization of American States (OAS), Inter-American Committee Against Terrorism, "Declaration of Montevideo", OEA/Ser. L/X.2.4, CICTE/DEC.1/04 rev. 3, 4 February 2004, p. 2. Available at: http://www.cicte.oas.org/Rev/en/Documents/Declarations/doc_dec_1_04_rev_3_eng.pdf (last visited 10 Nov. 2011); Council of European Union, Political and Security Committee, "Statement on strengthening international security", 16751/2/08 REV 2 (en), Brussels, 8 December 2008, p. 5. Available at: http://www.eu2008.fr/webdav/site/PFUE/shared/import/1211_Conseil_europeen/Statement%20on%20strengthening%20international%20security_EN.pdf (Last visited 10 Nov. 2011)

> "The Security Council notes with concern the increasing link, in some cases, between drug trafficking and the financing of terrorism, including through the use of proceeds derived from illicit cultivation, production of and trafficking in narcotic drugs and their precursors, as well as illegal arms trafficking (…)
>
> The Security Council encourages States to strengthen international, regional and sub-regional cooperation to counter drug-trafficking, transnational organized crime, terrorism and corruption... Through compliance with their obligations under international law, including the relevant resolutions of the Security Council, States can help strengthen international peace and security."[4]

1.13. The statement continued by referring to the relevant international conventions, including the UN Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances of 1988.

1.14. Colombia's aerial spraying program must be seen in this context, as a key component of a broader struggle against terrorism and drug trafficking. The program is designed to attack directly the supply of coca, thus decreasing the revenues generated through drug trafficking. It must be stressed that the program is a national one, not limited to border areas. Spraying operations have been conducted in 23 of the 32 Colombian provinces in exactly the same manner, and in compliance with

[4] UN Security Council, "Statement by the President of the Security Council", S/PRST/2010/4, 24 February 2010, pp. 1-2. Available at: http://www.unic.or.jp/security_co/pdf/prst_2010_4.pdf (Last visited 10 Nov. 2011)

the same parameters and regulations, as those conducted in the border area with Ecuador between 2000 and 2007, without registering adverse effects on human health, flora, fauna or the environment as a result.

1.15. As explained in the *Counter-Memorial*, the aerial sprayings take place when illicit coca crops cover a large expanse of land, are located in remote regions, or when manual eradication is too dangerous for the lives or personal integrity of the farmers or members of National Police and the Army who perform manual eradication, due to the presence of terrorist groups. The cost of manual eradication has been high for both military forces and the civilian population. Manual eradicators have often been injured or killed as a result of attacks by the guerrilla or drug-traffickers or have been maimed by landmines deployed as a means to protect illicit coca crops.[5]

1.16. In its *Reply*, Ecuador totally ignores the criminal and social phenomenon of illicit drugs and seeks to distort the real scope of the efforts deployed against the drug trade by Colombia. Ecuador wholly disregards the links between the financing of transnational crime and terrorism and drug trafficking, and the support it has provided to the illegal armed

[5] CCM, Vol. II, Annex 73; CR, Vol. VI, Annex 60: United Nations Office on Drugs and Crime (UNODC), *Colombia Coca Cultivation Survey 2010*, June, 2011, p. 73; CR, Vol. II, Annex 17: Testimony of a Police Officer victim of a land mine, Annual Report by the Anti-Narcotics Directorate of the Colombian National Police (DIRAN), *Results of the Breaking Point and Historical Management in the Fight Against Drug Trafficking for the year 2008,* p. 48.

groups that have sought to destabilize Colombian institutions, affected the country's productivity and promoted arms trafficking, violence and corruption, resulting in enormous damage to Colombia's society, economy and environment.

1.17. Ecuador asserts that the aerial fumigations "have been ineffective as a means of stemming the cultivation of coca."[6] A review of the statistical data shows that this is untrue. According to the 2011 Report of the United Nations Office on Drugs and Crime ("UNODC"), during the last ten years, Colombia succeeded in reducing the overall area under coca cultivation by 65.1%, moving from 163,300 hectares in 2000 to 57,000 in 2010.[7] As a result, while in 2000 73.8% of all the coca cultivation existing in the world was located in Colombia, in 2010 this percentage decreased to 38.2%. This successful campaign could certainly not have been accomplished without the aerial sprayings.

1.18. In a report issued in 2010 entitled *The Globalization of Crime: a Transnational Organized Crime Threat Assessment*, UNODC commended Colombia as "the country which has made most progress over the last few years in curbing the threats to national and international security emerging from drug

---

[6] EM, para. 2.54.

[7] UNODC, *World Drug Report 2011*, p. 99. Available at: http://www.unodc.org/documents/data-and-analysis/WDR2011/World_Drug_Report_2011_ebook.pdf?bcsi_scan_1DAA8B70D81D7BD8=qBC4TDYO8vj0PlYZ1kLMkcaGuiwFAAAA3DOsAw==&bcsi_scan_filename=World_Drug_Report_2011_ebook.pdf (Last visited 10 Nov. 2011)

production and drug trafficking."[8] The report stressed that the sharp decrease in coca cultivation was mainly due to Colombia's strategy[9] comprising aerial and manual eradication.

1.19. The Government of the United States – one of the countries most affected by cocaine consumption – also recognized the remarkable progress made in Colombia in the fight against drugs thanks to the aerial spraying program. The inaugural US National Drug Control Strategy, adopted in 2010, called Plan Colombia a "dramatic success" and acknowledged that:

> "Perhaps no country has faced a greater burden from drug-trafficking organizations than Colombia. At one point, the very existence of the Colombian state was threatened by insurgent and drug-trafficking groups enriched with drug-trafficking proceeds..."[10]

The Strategy underlined that aerial eradication will "remain an important tool, especially in remote and insecure areas, where manual eradication is cost prohibitive or too dangerous."[11]

---

[8] UNODC, *The Globalization of Crime, A Transnational Organized Crime Threat Assessment,* 2010, p. 228. Available at: http://www.unodc.org/documents/data-and-analysis/tocta/TOCTA_Report_2010_low_res.pdf. (Last visited 10 Nov. 2011)

[9] *Ibid.*

[10] United States Office of National Drug Control Policy, *National Drug Control Strategy*, 2010, p. 84.
Available at: http://www.whitehouse.gov/sites/default/files/ondcp/policy-and-research/ndcs2010.pdf (Last visited 10 Nov. 2011)

[11] *Ibid.*, p. 83.

1.20. The Director of the US Office of National Drug Control Policy, R. Gil Kerlikowske, recently declared:

> "Thanks in large part to Colombia's relentless eradication campaigns, for example, the production of pure cocaine fell from an estimated 700 metric tons potential pure cocaine production in 2001 to only 270 metric tons in 2009 – a 61 percent drop."[12]

1.21. The success of the program has also affected the finances of the narco-terrorist groups located in Colombia, as is confirmed by a recognized authority on Latin-American policy, Dr Gabriel Marcella:

> "The success of the aerial eradication operations in depriving the narco-terrorists of funding has been confirmed by the FARC itself. Among the computer files seized during the Colombian military raid of the camp of FARC commander Raúl Reyes on March 1, 2008, was an email in which Reyes bemoaned the impact of the spraying: 'In the area of finances, we have been unable to do a big deal, we have only done some small things, and the situation is difficult because of the eradication and fumigation.' Other captured records reflect the FARC's efforts to stop the spraying operations by raising concerns about alleged environmental effects. In one document, Raúl Reyes discussed a message from Ecuadorian Minister of National Security, Gustavo Larrea, in which the Ecuadorian minister was believed to be seeking to foster relations with the FARC in part by agreeing that Ecuador 'will sue the state and government of Colombia before the International Court for the damages the aerial spraying has caused.' In another

[12] Embassy of the United States in Colombia, Press Releases 2011, 18 Jan. 2011, *"Remarks by White House Drug Policy Director, Gil Kerlikowske to Mentor Foundation Colombia in Bogotá, Colombia"*. Available at: http://bogota.usembassy.gov/pr_001_18112011.html (Last visited 10 Nov. 2011)

> document, a top FARC commander notes that: 'The Bi-national Commission is being strengthened, made up of members of the PCCC [Clandestine Communist Party of Colombia, the civilian wing of the FARC] and Ecuadorian friends, so we can denounce the violations of Ecuadoran sovereignty by [Colombian President] Uribe's troops, and show the damaging effects of fumigation.' The FARC have also reportedly organized peasant demonstrations against the spraying."[13]

1.22. In the light of this background, Ecuador's characterization of the Colombian position is completely unwarranted.

1.23. As recalled in the *Counter-Memorial*, Colombia has complied with the obligation to take efficient measures to suppress production and consumption of illicit drugs, in accordance with the provisions of international treaties in force on the world drug problem and, in particular, the 1961 Single Convention on Narcotic Drugs, as amended by its 1972 Protocol, the 1971 Convention on Psychotropic Substances, and the 1988 Convention Against the Illicit Traffic in Narcotic Drugs and Psychotropic Substances.[14] This obligation runs parallel to that of all other States, including Ecuador, and is based on the principle of shared responsibility.

---

[13] CR, Vol. II, Annex 8: Expert Report Dr G. Marcella on behalf of the DynCorp Defendants in *Arias/Quinteros v. DynCorp* (D.D.C.), 17 Jan. 2011, pp. 31-32.

[14] CCM, paras. 3.59-3.64.

1.24. These efforts would be in vain without a joint concerted effort with other countries and regions; *a fortiori* in the case of a bordering country. All the links in the criminal chain must be fought: illicit crops, drug processing, clandestine laboratories, transport, distribution, consumption, money laundering, etc.

1.25. As stated in the *Counter-Memorial*, the cultivation of illicit crops and their transformation into processed drugs are the worst cause of environmental degradation in Colombia. This damage is caused by the slashing of forests to plant coca crops and the pollution generated by its processing. Between 2000 and 2010, 251,370 hectares of forest were cleared to plant coca, of which 121,026 hectares were primary forests of high complexity, bio-diversity and richness. To refrain from taking all measures necessary to counter illicit crops would have involved major neglect of Colombia's responsibilities as one of the world's most mega-diverse countries.

1.26. It is also important to recall that "the main concentration of coca cultivation is associated to the Putumayo River, mainly in zones of expansion of the area of influence of coca cultivation…"[15] This area, as can be verified in the 2010 UNODC Coca Survey, corresponds precisely to the area bordering Ecuador.[16]

---

[15] CR, Vol. VI, Annex 60: UNODC, *Colombia Coca Cultivation Survey 2010,* June, 2011, p. 31.

[16] *Ibid.*, p. 30.

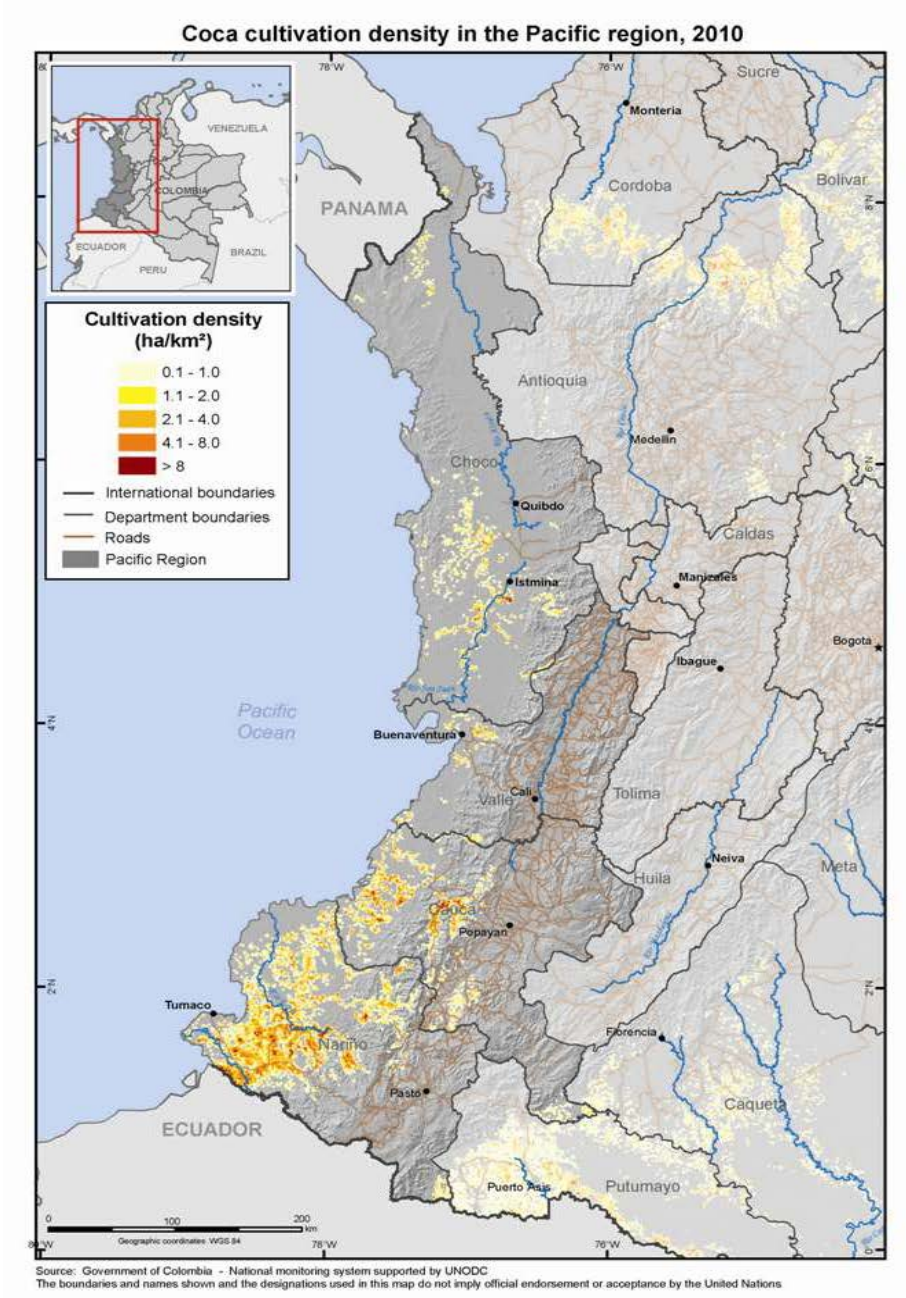


Figure 1-1 Coca cultivation density in the Pacific region, 2010.[17]

[17] CR, Vol. VI, Annex 60: UNODC, *Colombia Coca Cultivation Survey 2010,* June, 2011, p. 26.

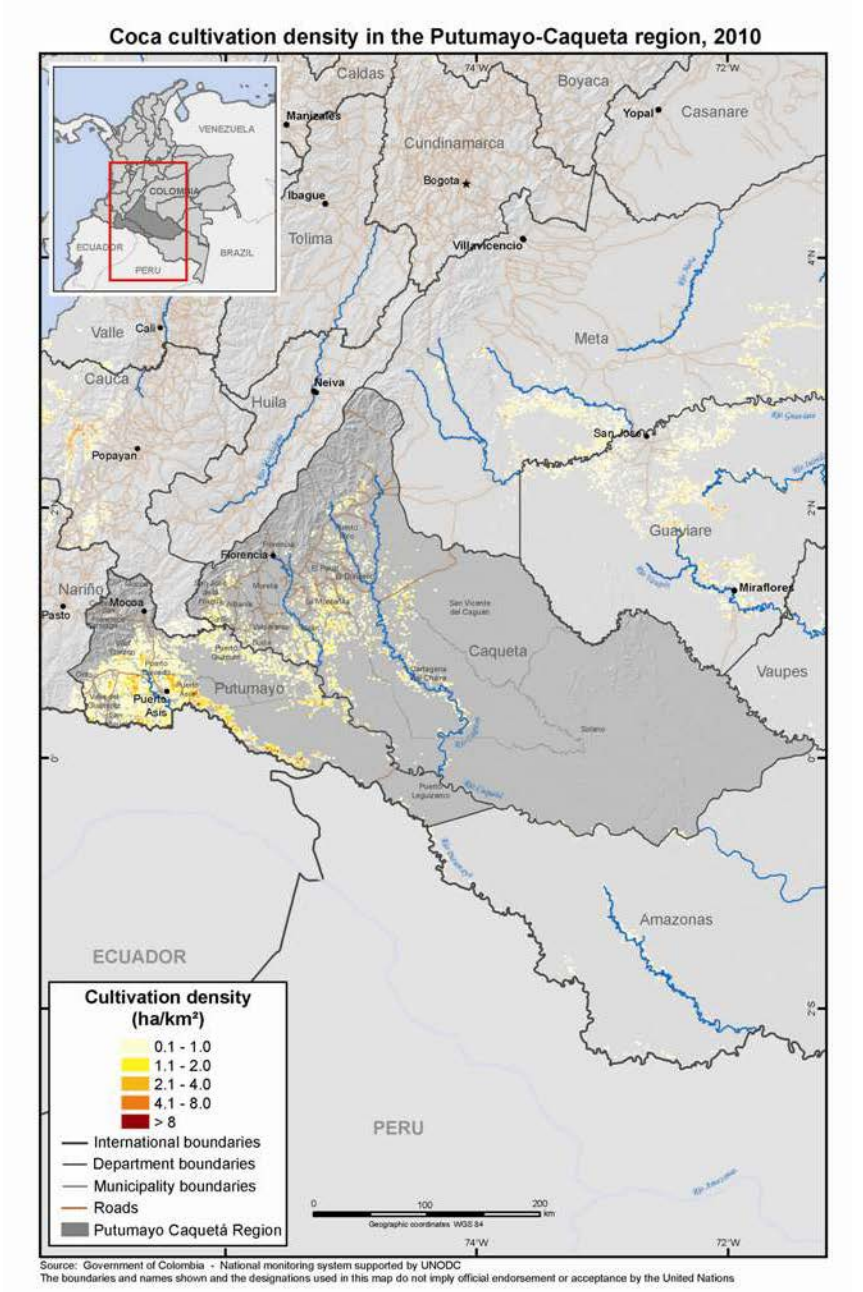


Figure 1-2 Coca cultivation density in the Putumayo-Caquetá region, 2010.[18]

[18] CR, Vol. VI, Annex 60: UNODC, *Colombia Coca Cultivation Survey 2010,* June, 2011, p. 30.

1.27. In spite of the undeniable success of the aerial eradication program, the danger that the situation may relapse is very real. For example, in the Province of Nariño, there were still 15,951 hectares planted with coca crops in 2010, and as for Putumayo, as noted above, the principal concentration of coca cultivation is associated with the Putumayo River.[19] Colombia must remain vigilant, particularly in the provinces of Nariño and Putumayo.[20] As was warned in the UNODC 2010 report on *The Globalization of Crime*, "the overall situation remains fragile. Without the continuation of efforts, Colombia could fall back to where it was a few years ago."[21] In this regard, it is important not to lose sight of the fact that, when spraying operations were suspended in the 10-km strip along the Colombia-Ecuador border in 2006, there was a 72% increase of the areas in which illicit crops were cultivated.[22]

C. Ecuador's Request for a Court-Ordered Buffer Zone

1.28. Ecuador has modified the requests made in its *Memorial* and added another request – devoid of any scientific justification – i.e. that the Court order a 10 kilometre buffer zone along the boundary between Colombia and Ecuador.

1.29. As will be demonstrated in this *Rejoinder*, the scientific evidence shows that significant deposition due to drift is only an

---

[19] CR, Vol. VI, Annex 60: UNODC, *Colombia Coca Cultivation Survey 2010,* June, 2011, p. 31.

[20] *Ibid*.

[21] UNODC, *The Globalization of Crime, A Transnational Organized Crime Threat Assessment,* 2010, p. 229.

[22] CCM, para. 4.75.

issue at a few meters (or, at most, at tens of metres) downwind of the spraying sites. It follows that the compulsory suspension of any sprayings within 10 kilometres from the common boundary is unnecessary, irrelevant and unacceptable. In this regard, it is important to recall certain points already discussed in the *Counter-Memorial*.

1.30. The border area between Colombia and Ecuador is divided into three sectors: the Pacific, the Amazonian and the Andean. The aerial sprayings have taken place only in the first two sectors since the third, the Andean sector, which is also the most heavily populated, is not affected by the cultivation of illicit coca crops. It should also be noted that the sprayings carried out in Colombian territory in the first two sectors of the border area cover only 140.13 kilometres of the 717 kilometres that make up the total length of the boundary, i.e. they only concern 19.55% of the boundary, as shown in the following figure:

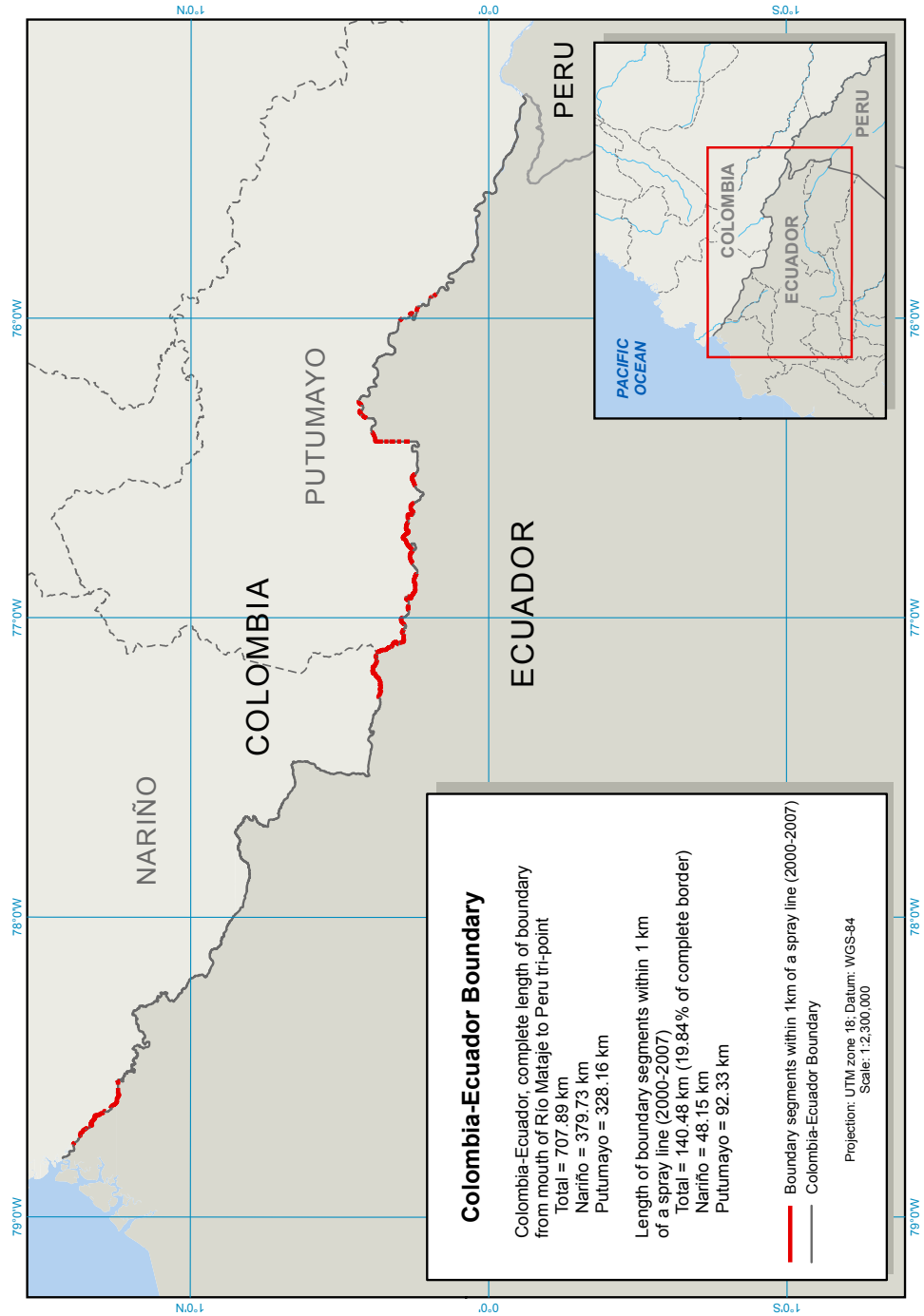


Figure 1-3 Colombia-Ecuador Boundary

1.31. For the most part, Ecuador's complaints arose from spray events that are alleged to have taken place in the Ecuadorian province of Sucumbíos, which adjoins Colombia via the Putumayo River, which has a width of between 600 and 1,500 metres in the sector, and through the San Miguel River, shown in Figure 1-4 below, which is on average 350 metres wide:

Figure 1-4 San Miguel River

1.32. Indicative of the misrepresentations of the facts on which Ecuador relies is the manner in which Ecuador, which should be well acquainted with the region since it fought for over a century to uphold its rights as an "Amazonian" nation, now asserts before the Court that, "[n]one of the border rivers are very wide; the distance between the Ecuadorian and Colombian banks can

be as little as fourteen metres."[23] In fact, the Putumayo River, which extends for 1,800 km, and is the most important affluent of the Amazon River in the region and Ecuador's essential access to the great river, reaches widths of over 1 kilometre. This is as shown in Figure 1-5 below:

Figure 1-5 Putumayo River

1.33. As explained in the *Counter-Memorial*, while there was an alarming increase in the growth of illicit coca crops on the Colombian banks of the Putumayo and San Miguel rivers, reaching 30% of the world's production total,[24] drug-traffickers have sought shelter in Ecuador in order to escape Colombia's

[23] EM, para. 2.11.
[24] CCM, para. 2.14.

police forces, build laboratories to process cocaine and establish deposits for arms.[25]

1.34. The "*Comisión de Transparencia y Verdad* 'Caso Angostura'" [Commission on Transparency and Truth for the Angostura Case] set up by the Ecuadorian Government in order to verify the situation existing in its territory bordering Colombia noted the following in a report of December 2009, with regard to the Putumayo-San Miguel sector:

> "For example, nearby the geodesic line that connects the Putumayo and San Miguel Rivers (border between the two countries in the Sucumbíos 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 Sucumbíos 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

[25] http://www.elmercurio.com.ec/291201-policia-de-ecuador-descubre-laboratorio-de-cocaina-en-costa-del-pacifico.html (Last visited 10 Nov. 2011);
http://www.eluniversal.com.co/cartagena/nacional/ecuador-encuentra-cultivo-de-coca-en-frontera-con-colombia-21838 (Last visited 10 Nov. 2011)
http://www.eluniversal.com.mx/internacional/70082.html (Last visited 10 Nov. 2011);
http://www.eltiempo.com/archivo/documento/CMS-4848236 (Last visited 10 Nov. 2011);
http://www.eluniversal.com.co/cartagena/internacional/hallan-en-ecuador-laboratorio-de-procesamiento-de-droga-36576 (Last visited 10 Nov. 2011);
http://www.eluniversal.com.co/cartagena/internacional/decomisan-385-kilos-de-marihuana-en-norte-de-ecuador-45858 (Last visited 10 Nov. 2011).

> fight with blood and iron for control of precursors, weapons and drugs cargos."[26]

1.35. Further on, the same document has the following to say about the Putumayo River:

> "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."[27]

1.36. Taking into account all the circumstances explained above and acknowledged by Ecuador itself, a mandatory 10-kilometre buffer zone would create a haven where criminals would be free to continue their illicit traffic undisturbed. Yet in spite of this obvious fact and the findings of Ecuador's own "*Comisión de Transparencia y Verdad*", and even in the absence of any scientific study or factual evidence justifying this position, Ecuador insists that the sprayings should be suspended in a 10-kilometre strip of territory parallel to the common border

---

[26] CR, Vol. V, Annex 45: Report of the Commission on Transparency and Truth for the Angostura Case, Report, Quito, Dec. 2009, p. 93.

[27] *Ibid*., p. 95.

and insists further that this be done indefinitely, unconditionally and by order of the Court.

1.37. On 25 June 2005 the group "Frente 49" of the "FARC", situated in Ecuadorian territory, attacked the Colombian military base at Teteyé, on the Putumayo River, killing l9 Colombian soldiers, kidnapping one soldier and leaving 11 more gravely injured.[28] In spite of the gravity of this incident – and notwithstanding the fact that drug trafficking is the main source of financing for the FARC – a month later Ecuador reiterated its request to establish a no-spraying zone of 10 kilometres parallel to the boundary.

1.38. Nevertheless, in a spirit of friendliness and cooperation, at the end of 2005 the Colombian Government offered – in a gesture that was heavily criticized from many quarters in Colombia – to suspend temporarily the sprayings in the zone up to 10 kilometres parallel to the border with Ecuador.

1.39. Colombia's gesture provoked an immediate and significant increase in the cultivation of illicit coca crops in the area and resulted in growing attacks by armed groups from Ecuadorian territory in the area in support of the activities connected with drug trafficking.[29]

---

[28] Ecuador Inmediato.Com, *"Uribe Demanda a Ecuador por ataque de las FARC"*, 27 June 2006. Available at: http://www.ecuadorinmediato.com/Noticias/news_user_view/ecuadorinmediato_noticias--16255 (Last visited 10 Nov. 2011)

[29] On 21 February 2006, an attack took place in the locality of San Joaquín on the Putumayo River; on 1st March 2006, an attack was launched

1.40. Ecuador's request to the Court to order Colombia to stop spraying within 10 kilometres of the border effectively moves the scope of the dispute to Colombian territory by establishing in such territory a band of about 7,200 km^2 situated in remote areas, characterized by difficult access and high risk, where illicit coca crops are cultivated. This would also imply an inevitable increase of the impact on human health and the environment caused by the growth of illicit crops and their processing, as reported by the CICAD I study.[30] It is one thing to make a temporary gesture of good neighbourliness, suspendable or terminable in case of need, and quite another thing is to have it imposed permanently by the Court. If the same procedure was followed in zones adjacent to Colombia's borders with other neighbouring States, it would lead to the absurdity of establishing an area, within Colombian territory, nearly as large as the Netherlands and Belgium put together, that could readily provide a haven not only for illicit crops, but also

---

against the Colombian military base of Quillacinga, from the Ecuadorian locality of Nuevo Colón, where the FARC terrorist organization had a strategic base for operations and sale of coca paste, ran by Oliden Solarte Cerón, a.k.a. Oliver; on 2 March, the Colombian naval vessel ARC "Riohacha" was attacked in the Putumayo river, from the Ecuadorian bank; on 30 March 2006, the Colombian military base of Quillacinga was again attacked by FARC from Nuevo Colón in Ecuador; on 6 April 2006, between the localities of San Luis and Puerto Ospina, on the border between both countries, river boats of the Colombian Navy on the Putumayo River were attacked from the Ecuadorian bank; on 21 June 2006, medical personnel from the hospital in Puerto Asís, capital of Putumayo Province, were kidnapped in the locality of Teteyé on the common border by an armed group that entered from Ecuador, and were taken to that country's territory; on 14 September 2006, naval units engaged in a drug enforcement operation were attacked from Ecuadorian territory in the area of Santa Helena. Subsequently, similar attacks continued to take place along the border.

[30] CCM, Vol. III, Annex 116, CICAD I, pp. 14-17.

for all the illegal and violent activities connected to the world drug problem.

1.41. Today, Colombia is a much safer place and its economic and social situation has considerably improved. According to the UNODC, world cocaine production has shown a marked downward trend, due to the decline in production in Colombia.[31] Banning aerial sprayings altogether in a strip of territory along the Colombia-Ecuador border would set the clock back to a time when terrorist groups and the drug trade prospered. It is an unacceptable option for Colombia, violative of its sovereignty; but its negative impacts would be felt well beyond the South American continent. Such a state of affairs would only benefit terrorist groups who will be able to resume their operations with profits generated by drug cultivation and trafficking. Colombia will return to this point in Chapter 5.

D. Ecuador's *Memorial* and *Reply*

1.42. While Ecuador's position has not changed significantly from the case laid out in the *Memorial*, its *Reply* shows a marked difference of degree in the overall approach to the main issues underlying its claims. On the one hand, Ecuador sets great stock in the material it obtained from the US Department of State pursuant to its FOIA requests and heavily relies on it in an attempt to give credibility to its witness evidence of human and environmental harm. On the other hand, Ecuador has given up any direct suggestion that the sprayings have caused deaths,

[31] UNODC, *World Drug Report 2011*, p. 37.

at least to the extent that it accepts that the alleged effects of the spray mixture on humans "might not necessarily be fatal."[32]

1.43. It also appears that Ecuador's case of environmental damage has been considerably downsized since – while two separate sections of the *Memorial* were devoted to this topic[33] – there is virtually no discussion of harm to plants and animals in the *Reply*. Although some general allegations of environmental damage are maintained Ecuador has not put forward any further evidence to its environmental claims, apparently intending to do so only "at a later stage of these proceedings"[34]

1.44. However, this will not do. Legally, the gist of Ecuador's claim is actual harm above a certain threshold of significance. In fact it makes claims of very serious harm. In circumstances in which the very essence of Ecuador's claim of environmental damage is that serious harm to the environment has occurred within its territory, Ecuador cannot expect the Court simply to take on faith that evidence of such harm exists, on the basis of a promise that it will "tender specific and complete evidence as to its environmental claims" at a later stage. Either it must produce evidence of harm at the present stage (which it has conspicuously failed to do), or its claim for environmental harm must fail for want of proof.

---

32 ER, para. 2.4.
33 EM, Vol. I, Chapter VI, Sections II, III and part of IV.
34 EM, para. 10.57.

E. Concluding Remarks

1.45. In its *Reply*, Ecuador attempts to portray a dramatic situation of its northern border area, allegedly as a result of the deposit of residues of the spray mixture used in aerial spraying operations conducted within Colombian territory between 2000 and 2007. The *Reply* does not allude, however, to the situation in the border provinces of Ecuador caused by the Government's long-standing neglect and the presence of drug traffickers, who have set up cocaine laboratories and smugglers, as pointed out by the *Comisión de Transparencia y Verdad* convened by the Ecuadorian Government to investigate the situation in the border with Colombia. It also fails to mention the illegal armed groups coming from Colombia that, with the tolerance or indifference of Ecuador's authorities, remain in Ecuadorian territory and profit from the illicit crops located in Colombia.

1.46. Ecuador attempts to substantiate its allegations by prefabricated testimony; by presenting unwarranted conclusions and counterfactual assumptions as undisputed facts, and by seeking to establish that Colombia breached its own regulations with regard to the conduct of the spraying program. Ecuador completely ignores the criminal and social phenomenon of illicit drugs and seeks to distort the real scope of the efforts deployed against it by Colombia. Ecuador wholly disregards the links between the financing of transnational crime and terrorism and drug trafficking. Colombia's aerial spraying program must be seen as a key component of a much broader struggle against terrorism and drug trafficking. This is the real context of the

dispute before the Court. The onus is on Ecuador to establish that the alleged harm has been caused, and this it has completely failed to do – as will be once more demonstrated in this *Rejoinder*. Indeed, the scientific reports attached to this *Rejoinder* do more than weigh in the balance – they establish beyond reasonable doubt that the aerial spraying program has *not* caused any harm to Ecuador, its people or its environment.

F. Outline of *Rejoinder*

1.47. This *Rejoinder* has four further chapters:

Chapter 2 refutes Ecuador's arguments concerning the character of the spray mixture and the crucial issue of drift. It shows that the spray mixture used by Colombia does not cause adverse effects on the environment, human and animal health, and that it has not been shrouded in secrecy as Ecuador suggests. It also shows that the deposit of herbicide in Ecuador has been zero or insignificant and, therefore, that it could not have caused any of the effects alleged by Ecuador. Ecuador has completely failed to establish that there have been damages in Ecuador due to the spray mixture's toxicity and its deposit in its territory. Ecuador's claim must fail.

Chapter 3 deals comprehensively with the Ecuadorian witness statements and other material produced as corroboration of those statements. Ecuador has completely failed to show that significant harm to humans, their property or the environment, has been

caused by the spray program. Its case must fail: it is not a breach of international law for *de minimis* quantities of a known and widely used herbicide to drift across a border, if they do no harm there. Ecuador has chosen to seek to prove its case primarily by some 45 witness statements, supplemented by documents which for the most part are parasitic upon accounts by local residents after the event (and not independently checked by the writers of those documents). This critical body of material is examined and analysed in detail; the analysis shows that it is not worthy of any credit at all, being largely contradicted by the spray data, and involving assertions of the scientifically impossible or implausible. The allegations of the individual witness statements are analysed in the **Appendix** to this *Rejoinder*.[35] Ecuador's case on damage and causation fails entirely.

That being so, Ecuador's claims as to the law take a decided back seat – indeed they miss the bus altogether. But they are dealt with, compendiously, in **Chapter 4**, which discusses in turn (a) Ecuador's claim concerning assessment, showing that, contrary to Ecuador's portrayal, Colombia undertook prior studies, an Environmental Management Plan that includes the essential elements of an Environmental Impact Assessment, has continuously monitored the aerial

[35] CR, Vol. I, p. 503, Appendix: *Analysis of Ecuadorian Witness Statements as to Timing and Location of Spraying and Alleged Effects* (261p.).

spraying program and has acted with due diligence; (b) its claim for breach of territorial sovereignty; (c) its claim for transboundary environmental harm, (d) its claim for breach of the human and indigenous rights of Ecuadorians.

Finally, in **Chapter 5** Colombia discusses the issue of remedies, on the supposition (*quod non*) that Ecuador establishes any basis of responsibility at all. It will show that even in that event, no substantial remedy is called for.

1.48. Accompanying this *Rejoinder* are the following expert reports, included in Volume II:

1. Dr Andrew J. Hewitt, Response to Report "Spray Drift Modeling of Conditions of Application for Coca Crops in Colombia" by D.K. Giles, (spray drift, response to Giles Report) Annex 1;
2. Dr Andrew J. Hewitt, Aerial Spray Drift Modeling of Plan Colombia Applications, (spray drift calculations) Annex 2;
3. Dr Keith R. Solomon, Expert Report, (toxicology and risk assessment) Annex 3;
4. Dr Stuart Dobson, Response to scientific papers in Annexes to Volume II of Ecuador's Reply (2011), (toxicology) Annex 4;
5. Alex Tait, International Mapping Associates, Statistical Summary of Data for Spray Events Within the Relevant Area Along the Border between Colombia and Ecuador, (geodetics, statistical analysis) Annex 5;

6. Dr Barry Evans, Expert Report, (satellite imagery; vegetation before and after spraying) Annex 6; and
7. Mr José Vicente Zapata, Critique of the Report Prepared by Ms. Claudia Rojas Quiñonez, dated January 2011 on "The Aerial Spraying Program and Violations of Colombia´s Domestic Laws Regarding the Environment and The Rights of Indigenous Peoples", (Colombian law) Annex 7.

The Court is respectfully requested to refer to these reports as independent documents. Their conclusions will referred to as necessary in this *Rejoinder*. Volumes II-VI comprise the documentary annexes to this *Rejoinder*.

Chapter 2

ECUADOR'S ARGUMENTS BASED ON THE ALLEGED TOXICITY OF THE SPRAY MIXTURE AND ON DRIFT

A. Introduction

2.1. The aerial sprayings conducted in the vicinity of the border between Colombia and Ecuador from 2000 to 2005, and subsequently for a brief period from late 2006 until 2007, were not carried out over Ecuadorian territory.[36] The case is about alleged material harm caused to Ecuador, its nationals, their property and the environment by drift of spray mixture across the boundary (and, relatedly, about the adequacy of Colombia's precautions as concerns possible harm).

2.2. As already shown in Colombia's *Counter-Memorial* and reiterated in Section B of this Chapter, the scientific evidence overwhelmingly confirms that the spray mixture used in the sprayings poses no significant hazard for human health and the environment. Ecuador has failed to prove otherwise or to substantiate any of the alleged damages. That is unsurprising as, given the characteristics and composition of the mixture, they simply could not have occurred.

2.3. Contrary to Ecuador's assertions, the evidence shows that, under the conditions in which spraying operations have been conducted, drift is only an issue in relation to areas, at

[36] See CCM, paras. 4.57-4.60, 4.65-4.66, 8.41-8.44.

most, tens of metres downwind of the application site. On this basis no buffer zone is called for, beyond the 100 metres provided for in Colombia's regulations, surrounding bodies of water, etc. With the use of accurate modelling and analysis of relevant spray events within 1 km of the border, Colombia will demonstrate that there was no deposit in Ecuador – or, if there was any, it was *de minimis*, insignificant and would have been well below the levels of concern for sensitive areas of interest.

2.4. The question of the composition of the spray mixture and the issue of drift will be dealt with in Sections B and C respectively. Section D deals with certain related issues by way of summary of Colombia's case on harm.

B. The Spray Mixture

2.5. Even though Ecuador has now retreated from its claim that Colombia's aerial spraying program has directly caused deaths and admits that "its effects on people might not necessarily be fatal",[37] it maintains in its *Reply* that Colombia did not disclose the precise components of the spray mixture and that it misrepresented its alleged harmful effects on the human and natural environment. Ecuador's *Reply* uses intemperate language and calls Colombia's defence a "grand deception" and a "pantomime", claiming that Colombia "entirely distorts reality in order to hide the true danger of the program".[38]

---

[37] ER, para. 2.4.

[38] ER, paras. 2.1-2.5.

2.6. These are serious accusations to which Colombia takes strong exception. As will be demonstrated in the following sections, not only are Ecuador's allegations (a) that Colombia has not disclosed all the components of the spray mixture, and (b) that the mixture is highly toxic, factually unfounded and scientifically incorrect, but Ecuador has elected not to submit information in its possession that directly contradicts its allegations.

(1) ECUADOR'S SELECTIVE USE OF THE DOCUMENTARY EVIDENCE

2.7. Colombia requested from the United States Department of State the record provided to Ecuador's counsel by the Office of Pesticide Programs of the United States Environmental Protection Agency ("EPA"). Ecuador's counsel had obtained this material pursuant to FOIA requests for information pertaining to coca eradication in Colombia.

2.8. This documentation includes six acute toxicity studies carried out in 2003 by an independent laboratory contracted by the State Department. The EPA then reviewed the set of studies which analysed the spray mixture (identified as Charlie) used in the eradication program – the components of which are exactly those indicated by Colombia (Gly-41, Cosmo-Flux and water) – and concluded that the studies were conducted in accordance with applicable standards and contained no irregularities. On the basis of the studies, the EPA classified the mixture as category III (mildly toxic) for eye irritation and category IV (slightly toxic) for all the rest.

2.9. Despite having received these studies through its FOIA requests, Ecuador ignores them altogether in its *Reply*. Ecuador has preferred not to file information in its possession that directly undermines its claims.

2.10. By way of background, it is worth noting that the 2003 acute toxicity studies of the spray mixture (acute oral, acute dermal, acute inhalation, primary eye irritation, primary skin irritation and dermal sensitization), contracted by the US State Department and reviewed by the EPA, were part of a process of monitoring and review of the aerial eradication program carried out in Colombia with the cooperation of the United States Government. The US Congress first authorized the aerial eradication program in 2000. Thereafter, it has continued to authorize these operations in every year up to the present, through three different Administrations (those of President Clinton, President George W. Bush and President Obama).

2.11. The spray mixture has been subject to comprehensive analyses carried out by the EPA and the State Department. Pursuant to the relevant US domestic appropriations legislation,[39] in order to make funds available for the

[39] Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002 (FOAA 2002). Available at: http://www.gpo.gov/fdsys/pkg/BILLS-107hr2506enr/pdf/BILLS-107hr 2506enr.pdf (Last visited 10 Nov. 2011); Consolidated Appropriations Resolution, 2003. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-108publ7/pdf/PLAW-108publ7.pdf (Last visited 10 Nov. 2011); Consolidated Appropriations Act, 2004. Available at: http://www.dsca.mil/programs/lpa/2004/getdoc.cgi_dbname=108_cong_ public_laws&docid=f_publ199.108.pdf (Last visited 10 Nov. 2011); Consolidated Appropriations Act, 2005. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-108publ447/pdf/PLAW-108publ

procurement of the chemicals to be used in the program, since 2002[40] the US Secretary of State has been required to make an annual determination and report to the Committees on Appropriations of the US Congress that certain conditions are met. These conditions are (in the formulation used in the 2009 and 2010 appropriations legislation), that, *inter alia*:

447.pdf (Last visited 10 Nov. 2011); Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2006. Available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h3057enr.txt.pdf (Last visited 10 Nov. 2011); Continuing Appropriations Resolution, 2007. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-110publ5/html/PLAW-110publ5.htm (Last visited 10 Nov. 2011); Consolidated Appropriations Act, 2008. Available at: http://www.gpo.gov/fdsys/pkg/BILLS-110hr2764enr/pdf/BILLS-110hr2764enr.pdf (Last visited 10 Nov. 2011); Omnibus Appropriation Act, 2009. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ8/pdf/PLAW-111publ8.pdf (Last visited 10 Nov. 2011); Consolidated Appropriations Act, 2010. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ117/pdf/PLAW-111publ117.pdf (Last visited 10 Nov. 2011)

[40] CR, Vol. IV: Annex 53-A: Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, p. 1, numerals 1, 2 and 3; 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, p. 6, numeral 1 and p. 7, numeral 2; 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, p. 1, numerals 1-3; Annex 53-D: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2005, p. 2; Annex 53-E: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2006, pp. 1-4, numerals 1-4; 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, p. 1, numeral 1, p. 2, numeral 2; 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, p. 2, numeral 1 and p. 4, numeral 2. The set of 8 Memoranda of Justification will be referred to collectively as Memoranda of Justification by the United States Department of State, 2002-2008 (Annex 53, Annexes 53-A to 53-G).

> "(1) the herbicide is being used in accordance with Environmental Protection Agency 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."[41]

2.12. On that basis, the US Secretary of State determined and certified to Congress that the required conditions were met by the spray mixture used in the Colombia aerial eradication program in 2002, 2003, 2004, 2005, 2006, 2007 and 2008.[42]

2.13. Colombia is reproducing in full at Annexes 53-A to 53-G the Memoranda of Justification Concerning the Aerial Eradication of Coca in Colombia issued by the State Department from 2002 to 2008, together with their attachments. These documents are publicly available on the website of the US State Department. They were discussed in Colombia's *Counter-Memorial* and partially annexed to that pleading.[43] Inexplicably, Ecuador makes no mention whatsoever of them, or their findings, in the *Reply*.

2.14. Section I of Chapter 2 of the *Reply* alleges that Colombia employed (without disclosure) highly toxic glyphosate-based

---

[41] Omnibus Appropriation Act, 2009. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ8/pdf/PLAW-111publ8.pdf (Last visited 10 Nov. 2011); Consolidated Appropriations Act, 2010. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ117/pdf/PLAW-111publ117.pdf (Last visited 10 Nov. 2011).

[42] For copies of the Memoranda, see CCM, Vol. III, Annexes 140, 143, 144, 146, 147, 149 and CR, Vol. IV, Annex 53, Memoranda of Justification by the United States Department of State, 2002-2008.

[43] See CCM, Vol. III, Annexes 140, 143, 144, 146, 147, 149.

formulations in addition to those it referred to in its *Counter-Memorial* and, further, that it down-played the toxicity of some of the ingredients of the formula used, namely Roundup SL and GLY-41.[44]

2.15. Ecuador's *Reply* goes so far as to argue that – although the chemical components of the mixture are identified – Colombia "has never revealed their precise formulations or the identity of all the additives", and alleges that "this information is conspicuously absent from the *Counter-Memorial*."[45]

2.16. These accusations are preposterous and are nothing but a smoke screen erected by Ecuador in a desperate attempt to confuse the issues in the face of Colombia's transparent approach. The components of the formula and their precise quantities and percentages have been provided both in Colombia's *Counter-Memorial* and were explained in detail in various communications with Ecuador from 2000 to 2004. As will be shown below, there are no secret additives in addition to what has already been publicly disclosed.

2.17. Ecuador ignores the fact that all the additives contained in the spray mixture are listed in the Sales Registration issued for this product by the Colombian Agricultural Institute (or "ICA", for its Spanish acronym) in conformity with Colombia's laws and regulations. This information is in the public domain and Colombia has done nothing to conceal it. On the contrary,

---

[44] ER, para. 2.17.
[45] ER, para. 2.15.

the relevant Sales Registration was submitted as Annexes 33, 39 and 46 of Colombia's *Counter-Memorial* and discussed in that pleading.[46] Again, this document is nowhere mentioned in Ecuador's *Reply*. Similarly, the *Reply* does not refer to any of the publicly available Colombian documents or the numerous websites that contain detailed information on the composition of the spray mixture, published since 2001 and which were discussed in Colombia's *Counter-Memorial*.[47]

2.18. The formula used in the mixture has been described since 2000 in public documents issued by entities charged with environmental control, such as the Ministry of the Environment, and in all the audits carried out by Colombia every year on a monthly basis.[48] Likewise, the formula is described in all the studies and documents that form part of Colombia's Environmental Management Plan.[49]

2.19. Officials from various agencies and entities – among them, those charged with verifying compliance with the EMP which includes verification of the formula used and its effects[50] – participate in field audits and monitoring. They include officials from the General Prosecutor's Office, the Ministry of

---

[46] CCM, para. 4.46. See also: CCM, Vol. II, Annexes: 33, 39 and 46.

[47] CCM, paras. 6.5-6.10.

[48] ER, Vol. V, Annex 132 : Order 599 of the Ministry for the Environment of 23 Dec. 1999, p. 5 : "Dilution 10,4 litres of Roundup (43,9%) + 13 litres of water + 0.25 of adjuvant".

[49] See CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001, p. 47, Chart 2.5.

[50] *Ibid.*, pp. 235-236.

the Environment, the ICA, the Anti-Narcotics Police ("DIRAN"), the Agustín Codazzi Geographic Institute ("IGAC"), the Institute of Meteorology and Environment ("IDEAM") and, when necessary, the Autonomous Regional Corporations ("CARs"), as well as members of universities.

2.20. The attachments to the US Memoranda of Justification also include a document entitled: "Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application" which describes the formula used in the aerial spraying program.[51] There are no mysteries and no secrets as Ecuador alleges; everything is available in a variety of public sources, including the internet.

2.21. It is obvious that certain information regarding the individual chemical ingredients of glyphosate and Cosmo-Flux is known only to the producing companies and is covered by trade secrecy or confidentiality. The legal notion of trade secret protection is universally known. In Ecuador, trade secrets are dealt with by Article 193 of the Intellectual Property Law, enacted in conformity with Article 260 of Decision No 486 of

[51] See e.g., "Chemicals Used for the Aerial Eradication of Illict Coca in Colombia and Conditions of Application"; attachment to the 2002 Department of State Memorandum of Justification, CR, Vol. IV, Annex 53-A (at p. 361). See also the attachment to the 2003 Memorandum of Justification "Updated Report on Chemicals Used in the Colombian Aerial Eradication Program" and attachments; CR, Vol. IV, Annex 53-B (at p. 435).

2000 of the Commission of the Cartagena Agreement on the Common Provisions on Industrial Property.[52]

2.22. In this regard, it is apposite to refer to a statement of the US EPA in connection with the use of pesticides used for the aerial spraying program in Colombia:

> "Data requirements on the chemical identity and composition of the formulated pesticide product, may be found in 40 CFR [Code of Federal Regulations] 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 [Federal Insecticide, Fungicide, and Rodenticide Act] confidential business information (CBI) and is entitled to treatment as trade secret or proprietary information. Agency risk assessments do not typically contain this information."[53]

2.23. Ecuador cannot demand that Colombia divulge information it does not possess, information which is covered by trade secrecy. Disclosure of such information is in any event unnecessary for the present case, since the formula used in the spraying program has been widely disclosed and publicized. It has also been the object – as a whole and in its individual components – of a number of studies, analyses and toxicological tests on animals, soil and water that have shown no adverse effects on human or animal health or on the environment.

---

[52] CR, Vol. VI, Annex 61: Decision N° 486 of the Commission of the Cartagena Agreement on the Common Provisions on Industrial Property, Article 260, 14 Sep. 2000.

[53] CR, Vol. IV, 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, p. 10.

2.24. With regard to Ecuador's allegation that the spray mixture and its ingredients are highly toxic to humans and animals, this is contradicted not only by the findings of the studies conducted on behalf of the US State Department and reviewed by the EPA, but also by the analyses conducted in the field by the Ecuadorian and Colombian Scientific and Technical Commissions in 2004 as well as independent scientific data and field studies. All these scientific studies and analyses confirm that the spray mixture used in the Colombia aerial eradication program causes no significant adverse effects on humans, animals or the environment.

2.25. Furthermore, as will be demonstrated in Chapter 3 below, Ecuador has not proved that its nationals have been exposed to the spray mixture, that they have in fact suffered the harm claimed, and/or that there exists a causal link between the aerial spraying and the supposed injuries.

2.26. Rather than relying on scientific data to support its allegations, Ecuador prefers to base it arguments on the warnings contained in the labels for the relevant products. This betrays a complete misunderstanding of the nature of warnings on labels. Classification and labelling of chemicals and chemical products is based on hazard (the potential to cause adverse effects) not on risk (the likelihood of these adverse effects being realised). These hazard-based label warnings indicate the areas of potential concern for use of the substance and provide information as to the precautions to be put in place during use.

2.27. As observed by Dr Solomon in his expert report attached to this *Rejoinder*, Ecuador's arguments reveal:

> "…[C]onfusion between the statements of hazard as appear on the label of the formulated product and the toxicity of the spray mixture. Statements such as 'Harmful if swallowed' on the label of the product refer to the undiluted concentrated material in the container and are intended for the information of those who handle the undiluted product. These instructions are intended for the mixers and loaders and are not relevant to bystanders who would be exposed to the diluted product as sprayed. These comments also are relevant to the discussion of the pictograms discussed in the response (Ecuador 2011, Figures 2.1 & 2.2, 2.41). By analogy, pure alcohol is 'dangerous if swallowed' but, when diluted with a mixer or in wine, it is an enjoyable beverage".[54]

2.28. Dr Solomon adds that:

> "None of the glyphosate-products used in the spray programs for coca and poppy in Colombia present a hazard to humans as sprayed. This is shown in the results of toxicity tests carried out on the mixture as sprayed in Colombia. This mixture consisted of the formulated product, Cosmo-Flux® 411F, and water in the proportion as loaded into the spray-aircraft. These tests on toxicity were carried out under Good Laboratory Practices, using standard protocols with appropriate Quality Assurance and Quality Control. Also included in the testing were confirmatory analyses of the content of glyphosate in the mixture to ensure that the values were consistent with the

[54] CR, Vol. II, Annex 3: Dr K.R. Solomon, Ph.D., Expert Report of Keith R. Solomon on Behalf of Colombia, Nov. 2011, para. 11 (hereafter referred to as Solomon Report (2011)). The reference concerns ER, paras. 2.19 -2-20.

> Environmental Management Plan of the spray program".[55]

2.29. As shown by Colombia in its *Counter-Memorial* and in this *Rejoinder*, there is extensive scientific and other evidence which Ecuador prefers to ignore and which fundamentally contradicts Ecuador's allegations as to the toxicity of the spray mixture.

2.30. One of the many inconvenient facts that Ecuador's *Reply* fails to address is represented by the findings of the members of the Ecuadorian Commission on Atomic Energy as part of a delegation sent by the Ecuadorian Foreign Ministry. The members of the Commission tested the waters of the rivers of the Sucumbíos province in 2004 and found no glyphosate residues.[56] This finding was followed by official declarations of the Ecuadorian Foreign Ministry which in particular stated, on 29 December 2004, regarding the situation at the border between Colombia and Ecuador:

> "The second stage, completed today, has allowed us to confirm the conclusion that was arrived at during last week's visit: there is an environment of calm, daily activities are conducted normally; the locals who were interviewed are in good health; animals and crops are in order. There has been no violation of the Ecuadorian airspace, nor has there been any displacement of persons."

The Ecuadorian Foreign Ministry concluded as follows:

> "In any case, even if it was to be accepted that Colombia has resumed aerial sprayings, the truth is

---

55 CR, Vol. II, Annex 3: Solomon Report, para. 12.

56 See CCM, paras. 5.45-5.63.

> that the observations conducted and the gathered testimony do not afford evidence of any repercussions in Ecuadorian territory."[57]

2.31. All Ecuador has to say about this episode in its *Reply* is that "Colombia's reliance on these statements is both misplaced and disingenuous".[58] Ecuador affirms that "Ecuador's searches for glyphosate residues were hopeless exercises: they were conducted at the wrong times and places" and states that glyphosate was not found because it dissipates quickly from the soil and after that it is undetectable.[59] Significantly, what Ecuador fails to comment on, is that the Ecuadorian Foreign Ministry also stated that there had been no violation of Ecuadorian airspace and that no evidence was found of any repercussions of Colombia's aerial sprayings in Ecuadorian territory. Further, no traces were apparently found of the mysterious and "highly toxic" ingredients that Ecuador alleges formed part of the spray mixture.

2.32. The program of aerial eradication of illicit coca concerns the territory of Colombia and has been carried out in conformity with its laws and regulations in the regions where illicit coca crops are located, including the regions of Nariño and Putumayo situated along the Colombia-Ecuador border. Colombia conducted the program in a manner that displayed the utmost attention to any possible risks posed by the herbicide used for human and animal health and the environment. As demonstrated

---

57 CCM, Vol. II, Annex 84 (emphasis added).
58 ER, para. 3.28.
59 ER, para. 3.30.

in the *Counter-Memorial*[60] and reiterated in Section C below, Colombia has also taken care to minimize any possible drift that might arise during the sprayings throughout its territory, including the limited areas along the border with Ecuador.

(2) THE COMPOSITION OF THE SPRAY MIXTURE

2.33. Ecuador asserts that Colombia "never revealed the precise formulations or the identities of all the additives"[61] used in the mixture and alleges that two additional, "highly toxic glyphosate-based formulations" were not disclosed.[62]

2.34. These allegations have no merit. As noted in the *Counter-Memorial*,[63] the principal ingredient in the spray mixture used in the program for the eradication of illicit coca crops is a commercial formulation of glyphosate called Gly-41, patented by the company Agrícola Colombiana with the Gly-41 trademark.[64] Prior to 2003, Roundup SL was used with alternate brand names which are identical as regards ingredients and composition of the formula and registered under the same EPA Registration Number, N° 524-308.[65] That means that in fact, only two spray mixtures were used.

---

60 CCM, paras. 4.67-4.70.

61 ER, para. 2.15.

62 ER, para. 2.17.

63 CCM, para. 4.50.

64 CCM, Vol. II, Annex 46.

65 CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 2, pp. 1-2. See also: CR, Vol. II, Annex 3: Solomon Report, para. 9

2.35. In addition to 44% of the formulated glyphosate-based products, the tank mixture used for spraying is composed of 1% Cosmo-Flux 411F adjuvant and 55% water.[66]

2.36. As explained in the document dated 23 September 2011 submitted by the EPA in response to questions raised by Colombia, and filed with this *Rejoinder* as Annex 55, the name Gly-41 is an alternate brand name for the product called Roundup Ultra. The same product is commercialized and sold in the United States under several names approved by the EPA. When the US company Monsanto applied for registration of this product in the US, it submitted 82 studies; a full bibliography of these studies is also reproduced as part of Annex 55.[67]

2.37. Ecuador distorts the composition of glyphosate and of the term "glyphosate-based product" and creates an untenable confusion of concepts. For instance, Ecuador states that: "glyphosate is not the only chemical in these glyphosate-based products …such herbicides include additional chemicals known as 'formulants'. One class of "formulants' is composed of surfactants… they can be even more toxic to human health and the environment than glyphosate itself."[68] This is simply wrong. As noted by Dr Solomon:

---

[66] EM, Vol. II, Annex 15, Tenth Article. See also, CCM, paras. 4.42-4.44.

[67] CR, Vol. IV, 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 Sep. 2011, Answer to Question 4, pp. 2 - 3 and attached bibliography.

[68] ER, para. 2.43.

> "Section I of Ecuador's *Reply* (Ecuador 2011, 2.17-2.21) makes a number of errors in interpretation of toxicity data that clearly show that they do not understand the basic principles of the toxicology or the use of pesticides. The following sections highlight these errors and show that the hazards of the mixture as sprayed during the aerial applications in Colombia are *de minimis*. Given the greatly reduced exposures that would be found a short distance away from the spray swath, the hazards of the mixture to the environment of Ecuador, if any, would be negligible."[69]

2.38. It should be noted that the glyphosate-based products used in the aerial spraying program have been approved in their entirety by the US EPA on the basis of toxicity studies. Therefore, it is not necessary, for purposes of establishing the toxicity of the mixture, to identify each of the individual components of the products contained therein. Moreover, this exercise would be pointless since, as mentioned above, the spray mixture was the object of six separate acute toxicity studies conducted by an independent laboratory and reviewed by the US EPA in 2003 upon the request of the State Department.[70] These studies classified the mixture in the lowest category of toxicity, IV, for four of the tests, III for eye irritation, and as Non-Sensitizer with regard to dermal sensitization. These classifications were found to be acceptable by the EPA.[71]

---

[69] CR, Vol. II, Annex 3, Solomon Report, para.8.

[70] CR, Vol. V, Annex 56-A: *Six Acute Toxicity Studies with Spray-Charlie,* SLI Study N° 3596.16, 20 Feb. 2003.

[71] CR, Vol. V, Annex 56: United States Environmental Protection Agency (EPA), Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia, p. 2.

2.39. As stated by the EPA in the document filed at Annex 55, studies of this type are typically undertaken in order to determine what precautionary statements should appear on pesticide labels and are performed with the undiluted product formulation. This process is explained in the following terms by the EPA:

> "[T]he 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 (…)".[72]

2.40. In this case as well, the studies included the following: acute oral toxicity, acute dermal toxicity, acute inhalation toxicity, primary eye irritation, primary skin irritation and dermal sensitization. The spray formulation as a whole and some of its individual ingredients, including Roundup SL, Fuete

[72] CR, Vol. IV, 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 Sep. 2011, Answer to Question 8, p. 5.

SL (two products which, as seen above are identical in terms of ingredients and composition of the formula) and Cosmo-Flux 411F were separately tested.

2.41. The tests revealed no mortality in the animal test-subjects, even when the spray mixture was administered directly. To the extent that minor transient symptoms appeared, they disappeared after 24 hours and in the worst case scenario after a few days, without leaving any sequel or requiring any treatment. Consequently, the EPA concluded that all six acute toxicity studies have been reviewed and classified as "acceptable" and that toxicity profile for Spray Charlie, based on the results of those studies, is category IV, except for eye irritation, which is Category III.[73]

2.42. Colombia analyzed the material requested by Ecuador from the US State Department in response to their FOIA requests for information pertaining to coca eradication in Colombia. Ecuador specifically requested the six toxicity studies by a letter addressed to the EPA on 11 November 2008.[74] Ecuador was therefore fully aware of these studies as early as 2008 and had them in its possession at the time when the *Reply* was filed as a result of its FOIA request. Nonetheless, Ecuador has formulated its arguments as if no such documentary evidence existed.

---

[73] CR, Vol. V, Annex 56: United States Environmental Protection Agency (EPA), Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia.

[74] CR, Vol. V, Annex 57: Letter by Ms Rebecca L. Puskas to U.S. Environmental Protection Agency, item (18), p. 4, 11 Nov. 2008.

2.43. The toxicity studies that Ecuador has chosen to ignore are highly probative on two levels: (i) they confirm that the composition of the spray mixture corresponds exactly to what Colombia has previously stated in these proceedings is the composition of the spray mixture used, and (ii) they classified the mixture as category III (mildly toxic) for eye irritation and category IV (slightly toxic) for all the rest.

2.44. This material alone is sufficient to rebut Ecuador's arguments. However, the evidence does not end here. Indeed – as recalled in detail in Colombia's *Counter-Memorial* (and ignored by Ecuador in its *Reply*) – there is no scientific evidence of significant risks to human or animal health or the environment due to exposure to the spray mixture used in Colombia's aerial eradication program.[75] The studies contracted by the US State Department and reviewed by EPA, and the analyses conducted by the Ecuadorian Atomic Energy Commission and independent scientists all reach the same conclusion.

2.45. Notwithstanding this evidence, Colombia will address below Ecuador's unfounded allegations that there were mysterious ingredients in the mixture and will show that no significant threats are posed to human or animal health or the environment by the spray mixture used in the spray program or by any of its components.

---

[75] CCM, paras. 7.10-7.15, 7.42-7.123.

(a) Glyphosate

2.46. As explained in Colombia's *Counter-Memorial*, the active ingredient of the mixture, glyphosate, is the most commonly used herbicide world-wide since 1971.[76] The widespread use of this herbicide is mainly due to its low level of toxicity combined with its effectiveness in inhibiting the growth of a variety of weeds. Given that glyphosate has no residual soil activity - i.e., it does not leave active residues and dissipates quickly from the soil - it can be applied to targeted plants without impeding new plantings after application.[77]

2.47. Glyphosate is non-volatile, does not bio-accumulate, and its oral and dermal adsorption rate is very low.[78] Given these characteristics and the fact that the spray mixture is applied through aerial sprayings, the effects that are most likely to occur *through direct over-spraying* (and not through drift) would be moderate skin and eye irritation, both minor conditions that have no long-term consequences and respond to simple medical treatment.[79]

2.48. The fact that severe toxic effects are highly unlikely following the aerial sprayings is supported by the data

---

[76] CCM, paras. 4.48-4.49. See, also, CCM, Vol. III, Annex 116; CICAD I; and CR, Vol. II, Annex 9: Expert Report of Joseph M. Ditomaso prepared for the Dyncorp Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), 20 Jan. 2011, p . 4.

[77] CR, Vol. II, Annex 9: Expert Report of Joseph M. Ditomaso prepared for the Dyncorp Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), 20 Jan. 2011, p. 5.

[78] EM, Vol. III, Annex 132, EPA*, R.E.D.* p. 4; CCM, Vol. II, Annex 96, pp. 5, 22.

[79] CCM, Vol. I, Appendix: Dobson Report (2009), paras. 26-29.

concerning the conduct of the Program in Colombia. As mentioned in the *Counter-Memorial*, the Colombian National Health Institute has monitored health complaints arising as a result of the program from 2002 to date and has found no causal link between alleged exposure and the appearance of the clinical symptoms complained of.[80] Those conclusions were reached either because it was determined that no spraying operations were carried out in the relevant area at the time referred to in the complaint, or because it was concluded that the health effects resulted from causes other than exposure to the spray mixture. In other words, even in Colombian territory, no relation between the sprayings and any alleged damages has been established since the beginning of the program to date. Instead, it was concluded that the complaints received were mainly related to the endemic health conditions of the region in question.[81]

2.49. Quite apart from its use in the Galapagos Islands,[82] glyphosate and glyphosate-based formulations are widely used in Ecuador. Table 1 (opposite) lists some examples of herbicides registered in Ecuador containing glyphosate as an active ingredient. The source of this information is the Ecuadorian counterpart of the ICA, i.e. the *Agencia Ecuatoriana de Aseguramiento de Calidad del Agro*, also known as Agrocalidad.[83]

---

80 CCM, para. 7.64.

81 CCM, Vol. II, Annexes 68 and 69.

82 CCM, para. 4.49.

83 The mission and strategic objectives of this governmental agency of Ecuador are described on its website: http://www.agrocalidad.gov.ec/agrocalidad/index.php/es/la-institucion/mision (Last visited 10 Nov. 2011).

COMMERCIAL NAME	USE	CONCENTRATION	TOXIC CATEG	REGISTRY No.	MANUFACTURER
ROCKET/ ROUNDUP 747	Control as ripener of sugar cane	74.7%	III	39 - H21	MONSANTO COMPANY (MEX/CANAD) CIA. AGRICOLA COLOMBIANA (COLOMBIA)/MONSANTO DE BRASIL
GLIFOLAI/ BLASTOFF 361 SC	Non-crop weed control in water courses	GLYPHOSATE 355g/l +METSULFURON METIL 6 g/l	IV	117 - H 1-SESAU	DUPOCSA PROTECTORES PARA EL CAMPO S.A.
TIRANO	Non-crop weed control in potato cultivation	620 g/l	III	39 - H 68/NA	YANGHZHOU PIONEER CHEMICAL CO. LTD.
SHYFO	Control of milkweed, nettle, burclover, common wireweed, Indian goosegrass, angel grass and diffused flatsedge in the cultivation of African Palm (30/04/2010)	480 g/l	II	39 - H 71/NA	SHARDA WORLDWIDE EXPORTS PVT. LTD.
TOUCHDOWN IQ SL	Non-crop weed control in the cultivation of bananas (05/01/2008)	500 g/l	IV	39 - H 65-SESAU	SYNGENTA CHEMICAL B.V.
	Non-crop weed control in the cultivation of African Palm (25/01/2010)				

TABLE 1. Examples of registered use in Ecuador of products with glyphosate active ingredient (Source: Agrocalidad 2011)

2.50. Due to its extensive use worldwide, the possible effects of glyphosate on humans, animals and the environment have been the object of numerous scientific and environmental studies spanning the last three decades.[84] The scientific literature on the effects of glyphosate also covers formulated glyphosate, i.e. the formulation created when surfactants are added to glyphosate in order to enhance its effectiveness. The addition of surfactants to glyphosate is common practice and a large number of such formulations are sold to the public and used for agriculture and weed control in gardens and parks all over the world.[85]

[84] CR, Vol. II, Annex 9: Expert Report of Joseph M. Ditomaso prepared for the Dyncorp Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), 20 Jan. 2011, p. 6.

[85] *Ibid.*, pp. 4, 10, 23.

2.51. As to Roundup SL and GLY-41, Ecuador continues to put great stock in the hazard statements contained on the labels of these products (and of Roundup Export),[86] as evidence that they pose a risk to human health, animals, crops and the environment, whilst ignoring the scientific evidence showing risk to be minimal.[87] Such an approach misrepresents the origin and purpose of warning labels and ignores the difference between hazard and risk.

2.52. For instance, for products registered in the United States, these statements are based on the EPA's assessment of the scientific documentation filed in support of the registration of the product. In the EPA's own words:

> "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. This information is used in order 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

[86] ER, paras. 2.19, 2.32, 2.37.

[87] The labels are reproduced at EM, Vol. III, Annex 129 and ER, Vol. III, Annex 28.

> 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, re-entry restrictions to treated areas, use of personal protective clothing and equipment, and buffer zones."[88]

2.53. Thus, it is clear that the purpose of a label is to highlight the potential harmful effects of a product (the hazard) and inform on the proper use of the product. To infer from the presence of such labels that use of a product always causes the harmful effects described therein is misconceived. Use of the precautions indicated on the label should preclude the hazard becoming risk (potential harm should never become real harm). In the United States, a country where some of the labels reproduced by Ecuador were issued, the courts have generally recognized that the issuance of labels and other similar actions by a regulatory agency do not in themselves constitute scientific evidence, let alone *reliable* scientific evidence that may be used to establish general causation of harmful effects. [89]

---

[88] CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 8, p. 5.

[89] See *Wells v. SmithKline Beecham Corp*., 601 F.3d 375, 381 n.30 (5th Cir. 2010); *Turner v. Iowa Fire Equipment Co*., 229 F.3d 1202, 1209 (8th Cir. 2000); *Moore v. Ashland Chemical, Inc.*, 151 F.3d 269, 278 (5th Cir. 1998); *Rosen v. Ciba-Geigy Corp.,* 78 F.3d 316, 319 (7th Cir. 1996); *Lopez v. Wyeth-Ayerst Labs, Inc.*, No. CV-94-04054, 1998 WL 81296, *2 (9th Cir. Feb. 25, 1998); *Stapleford v. Secretary of Health and Human Services*, No. 03-234V, 2009 WL 1456441, *11-*12 (Fed. Cl. May 1, 2009); *Dellinger v. Pfizer, Inc.,* No. 5:03CV95, 2006 WL 2057654, *9 (W.D.N.C.

2.54. As noted above, from 2002 to 2008, the US Secretary of State has specifically certified that the herbicide mixture employed by Colombia was used in accordance with EPA label requirements for comparable use in the United States and with the requirements under Colombian law contained in the Colombian Environmental Management Plan for aerial fumigation.[90]

2.55. In addition to the process of consultation and review undertaken in the United States by the EPA and the State Department, independent scientific evidence supports the conclusion that commercially available glyphosate and glyphosate-based formulated products have no serious ill effects on human health, nor do they severely affect animals or the environment.[91] For example, as discussed in the *Counter-Memorial*, independent analyses of Colombia's aerial sprayings program were conducted under the auspices of an organ of the Organization of American States ("OAS"), the Inter-American Commission of Drug Abuse Control ("CICAD"). These analyses culminated in two studies, which were completed in 2005 ("CICAD I") and in 2009 ("CICAD II").[92]

July 19, 2006); *Nelson v. American Home Prods. Corp.*, 93 F. Supp. 2d 954 968-969 (W.D. Mo. 2000).

[90] See, for all, CR, Vol. IV, 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, pp. 2-3.

[91] CCM, para. 4.47. See also: CCM, Vol. II, Annexes 96, 101; Vol. III, Annexes 124, 125, 126, 128, 132.

[92] The CICAD studies have been filed as CCM, Vol. III, Annexes 116 and 131 A-I.

2.56. The members of the Scientific Assessment Team ("SAT") that was charged with conducting these analyses were selected by CICAD on the basis of their scientific knowledge and standing, and came from countries other than the United States and Colombia in order to ensure their independence.[93] The leader of the SAT was Dr Keith Solomon of the University of Guelph, in Canada, a renowned expert in the field of ecotoxicology and risk assessment, and a particular expert on the toxicity of glyphosate.

2.57. Dr Solomon provided an expert report on behalf of the defendants in the *Arias* v. *Dyncorp* proceedings currently pending before a US District Court for the District of Columbia under the US Alien Tort Claims Act.[94] In his expert report, Dr Solomon stressed the importance of the team's independence in the following terms:

> "Because of the political sensitivity of the allegations that had been made regarding the Plan Colombia aerial eradication operations and to ensure both the fact and appearance of independence, CICAD decided that all members of

[93] The other members of the team were: Dr Arturo Anadón, Universidad Complutense de Madrid, mammalian toxicologist; Dr Antonio Luiz Cerdeira, EMBRAPA, Brazil, technology of application of herbicides and their fate in tropical regions; Dr Jon Marshall, Marshall Agroecology Limited, U.K., agroecologist and expert on the use of pesticides in management of pests; Dr Luz-Helena Sanin, University of Toronto, Canada, epidemiologist and expert on the effects of pesticides in humans.

[94] See e.g. *Arias/Quinteros* v. *Dyncorp*, 517 F. Supp. 2d 221 (2007). Dr Solomon's report in *Dyncorp* is filed as CR, Vol. II, Annex 10: Expert Report of K.R. Solomon on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, 18 Jan. 2011.

> the SAT would have to be from countries other than the United States and Colombia."[95]

Dr Solomon added:

> "The SAT operated independently of the U.S. and Colombian governments (and of the State Department contractor Dyncorp). None of these entities had input or editorial control of the reports of the SAT, except insofar as various reports published by the governments of Colombia and the United States were used as references, where appropriate."[96]

2.58. With regard to the possible risks of the herbicide to human health, CICAD I noted that the only adverse side effect of glyphosate that had been documented was a slight to moderate irritation of the eyes and, possibly, the skin.[97] This conclusion also matches findings of the acute toxicity studies carried out on the spray mixture in 2003 by an independent laboratory contracted by the State Department and reviewed by the EPA, the conclusions reached in the Dobson Reports, and a number of other scientific studies showing that skin or eye irritation may occur only in case of *direct exposure* to the spray mixture or *over-spray*.[98] Yet, even in the case of the mixers and

---

95 CR, Vol. II, Annex 10, p. 3.

96 *Ibid.*, p. 4. See also, CR, Vol. II, Annex 3, para. 5.

97 CCM, Vol. III, Annex 116: CICAD I, p. 78.

98 See CR, Vol. II, Annex 4: Dr S. Dobson, OBE Ph.D., *Response to Scientific Papers in Annexes to Volume II of Ecuador's Reply (2011)*, Dec. 2011, (hereafter referred to as Dobson Report (2011)) para. 37, p. 15; CCM, Vol. I: Appendix, Dobson Report (2009), paras. 26-29; CR, Vol. V, Annex 56: United States Environmental Protection Agency (EPA), Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia, p. 2.

loaders engaged in Colombia's aerial spraying eradication program, there have been no significant harmful effects.[99]

(b) Cosmo-Flux 411F

2.59. Ecuador also alleges that Colombia never revealed the full composition of Cosmo-Flux 411F, asserts that its ingredients are labelled "confidential" and alleges that the addition of Cosmo-Flux 411F makes the mixture more toxic.[100]

2.60. Several arguments can be made in response. First, for purposes of establishing the mixture's toxicity, it is not necessary to determine in detail each of its individual components. In any event, the surfactant Cosmo-Flux 411F was separately tested in the toxicity studies requested by the United States State Department of the US EPA; no significant adverse effects were found and a favourable opinion "on hazard characterization of Cosmoflux" was given.[101] The EPA did know the full composition of Cosmo-Flux 411F but treated it as confidential business information, given that the formula was subject to intellectual property protection. As stated by the EPA in the document attached at Annex 55, under US law the EPA is required:

---

[99] CR, Vol. IV, 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. Nov. to 4 Dec.2004, 7 Dec. 2004, p. 14.

[100] ER, para. 2.55.

[101] CR, Vol. IV, Annex 54: United States Environmental Protection Agency (EPA), Office of Pesticide Programs. Details of the 2003 Consultation for the State Department. Use of Pesticide for Coca and Poppy Eradication Program in Colombia. June 2003, pp. 13-14.

> "...[T]o protect information that 'contains or relates to trade secrets or commercial or financial information obtained from a person and privileged or confidential.'"

Further, this Agency must:

> "…[I]nitially 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."[102]

2.61. Whatever the individual chemical components of the spray mixture, in its 2002 analysis the EPA expressly concluded that: "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."[103]

2.62. Further, as remarked by Dr Solomon in the report submitted in this case:

> "Ecuador's *Reply* (Ecuador, 2011 at para. 2.49) also discusses Cosmo-Flux 411F and claims that the ingredients are in some way 'secret'. This is not the case. Despite Ecuador's assertion, the ingredients

---

[102] CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 5, p. 3.

[103] CR, Vol. IV, Annex 53-A: State Department Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Executive Summary, Consultation Review of the use of pesticide for coca eradication in Colombia, Section Findings, p. 10.

> were listed (Solomon et al. 2007b) as 'a mixture of linear and aryl polyethoxylates, (17% w/v) and isoparaffins (83% v/v)'. This is also clearly stated on the label of the product (Cosmoagro, 2004) so it is not 'secret'."[104]

2.63. Moreover, Ecuador is well acquainted with Cosmo-Flux 411F and must be fully aware of its components, since its Ministry of Agriculture approved its registration for sale and use in Ecuadorian territory.[105] Although this point was already made in Colombia's *Counter-Memorial*, it is simply ignored in Ecuador's *Reply*, which wrongly insists that Cosmo-Flux 411F "is only produced and used in Colombia".[106]

2.64. While asserting that the composition of Cosmo-Flux 411F is unknown, Ecuador affirms – in direct contradiction to that premise – that "there is no doubt that Cosmo-Flux makes the mixture more toxic".[107] As shown above, there is no scientific basis for this allegation. Ecuador has provided no evidence substantiating its sweeping statement apart from some isolated statements which, upon examination, do not support Ecuador's arguments.

2.65. In particular, Ecuador relies on a statement in the CICAD I study that "the toxicity of the mixture of glyphosate and Cosmo-Flux was greater than that reported for glyphosate itself."[108] However, this statement has nothing to do with the

---

104 CR, Vol. II, Annex 3: Solomon Report, para. 15.
105 See CCM, pars. 4.54-4.56, and CCM, Vol. II, Annex 74.
106 ER, para. 2.52.
107 ER, para. 2.55.
108 CCM, Vol. III, Annex 116: CICAD I, p. 86.

possible toxic effects of the mixture on humans. When it comes to humans, or mammals in general, the conclusion is radically different. The relevant part of the study, omitted by Ecuador but cited in Colombia's *Counter-Memorial*, expressly concluded that: "the addition of Cosmo-Flux to the spray mixture did not affect the toxicity of the glyphosate to mammals."[109] On the basis of the available data the final conclusion of the study was as follows:

> "[I]t is clear that potential exposures to glyphosate and Cosmo-Flux as used for the eradication of coca and poppy in Colombia *do not present a risk to human bystanders*. In all cases, the margin of exposure for the most sensitive endpoint in laboratory animal studies with glyphosate was greater than 100 – a conservative value often used to account for uncertainty in risk assessments of this type. As well, estimated worst-case exposures were below the Reference Dose (RfD) established for glyphosate by the USD EPA. The toxicity values used in both of these approaches were derived from chronic exposures where the animals were dosed over extended time periods. They are thus additionally protective of short and infrequent exposures that would occur during the use of glyphosate in the eradication spray program."[110]

2.66. Moreover, the source of the information relied upon by Ecuador is not correct. As stated by Dr Solomon:

> "Although Cosmo-Flux 411F is added to many agricultural pesticides to increase their efficacy, the increase in toxicity to coca may not be a great as is claimed in Ecuador's *Reply* (Weller 2011, p. 15, see

---

[109] CCM, Vol. III, Annex 116: CICAD I, p. 78, cited in CCM, at para. 4.52.

[110] CCM, Vol. III, Annex 116: CICAD I, p. 85 (emphasis added).

> section 7 below). Cosmo-Flux 411F, in and of itself, was shown to not be highly toxic to juvenile fish (*Piaractus brachypomus*) where an LC50 of >4000 mg/L was reported (Rondon-Barragan et al. 2007). Based on these observations, it appears that the Cosmo-Flux 411F does not significantly enhance the toxicity of formulations of glyphosate to plants or to fish that are, in fact, found in Colombia."[111]

2.67. Ecuador further relies on a statement contained in the Dobson report filed with Colombia's *Counter-Memorial*, to assert that the addition of Cosmo-Flux "increases the potency of the glyphosate formulation to coca plants fourfold" and that other plants will be "more susceptible to the herbicide spray enhanced with the adjuvant."[112] Again, this is another telling example of Ecuador's distortion of the evidence since this statement, self-evidently, does not concern the possible effects of the mixture on humans and animals, but its effect on plants. Further, even when it comes to plants, Dr Dobson states that the potency of the formulation is enhanced by Cosmo-Flux four-fold not for all plants, but only for coca and other plants "with cuticular protection comparable to the coca". Dr Dobson adds that "plants with no protective coating on the leaves would show no increased toxicity – it is only possible to die once and the application rate of spray in terms of the glyphosate itself remains constant for all formulations/adjuvants."[113]

---

111 CR, Vol. II, Annex 3: Solomon Report, para. 17.

112 ER, para. 2.56.

113 CCM, Vol. I, Appendix: Dobson Report (2009), para. 81.

2.68. Significantly, the overall conclusions of the CICAD II study, published in 2009 in the *Journal of Toxicology and Environmental Health* stated as follows:

> "Overall, the risks to sensitive wildlife and human health from the use of glyphosate in the control of coca (and poppy) production in Colombia are small to negligible, especially when compared to the risks to wildlife and humans that result from the entire process of the production of cocaine (and heroin) in Colombia."[114]

2.69. As will be seen, the EPA also stressed in its 2002 (and subsequent) reviews that there are no risks of concern for glyphosate or for the spray adjuvant, Cosmo-Flux 411F, and concluded that the spray mixture used by Colombia for its aerial coca eradication program poses no significant adverse effects for human health.[115] In particular, with regard to Cosmo-Flux 411F, the 2002 review noted as follows:

> "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-

---

[114] CCM, Vol. III, Annex 131-A: CICAD II, p. 919.

[115] See below paras. 2.89-2.92. See also: CR, Vol. IV, Annex 53-A, Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002; CR, Vol. IV, 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; CR, Vol. IV, 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.

term) dietary exposure through food and water from the coca eradication program."[116]

(c) Ecuador's allegations as to other "formulants" used in the spray mixture

2.70. Ecuador alleges that glyphosate and Cosmo-Flux 411F are not the only chemicals present in the mixture, arguing that other chemicals known as "formulants" are also included. According to Ecuador, these additional chemicals magnify the effect of the spray and can be more harmful than glyphosate itself. Ecuador focuses on the POEA surfactant as the only one mentioned by Colombia in its *Counter-Memorial*.[117] Ecuador claims that POEA is not a "single chemical, but instead describes an entire category of chemicals with a range of toxicities and effects."[118] While Ecuador invites Colombia to provide "specific information about *which* POEA surfactant it uses", at the same time it sweepingly argues that: "all chemicals that are classified as POEA are harmful to human health and to the environment."[119]

2.71. It should be emphasized that POEA is not an additive that Colombia itself adds to the spray mix: it is a surfactant that forms part of the formulated glyphosate product. It is correct that POEA is not a single chemical but a mixture of

---

116 CR, Vol. IV, Annex 53-A, Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Executive Summary, Consultation Review of the use of pesticide for coca eradication in Colombia, Section Findings, p. 10.

117 ER, para. 2 .44.

118 *Ibid*.

119 ER, para. 2.45.

components. The published risk assessments[120] have chosen formulations which contained POEA because this was the worst case scenario – as POEA is the most toxic of the surfactants used – and yet no significant adverse effects were found, except for, in early studies, a toxicity caused by some components of POEA for aquatic organisms in shallow waters. As noted by Dr Dobson, "Over time, POEA as used in pesticide formulations has changed to reduce the presence of these more toxic components."[121]

2.72. In this respect Dr Solomon affirms in his report filed with this *Rejoinder* that:

> "…Ecuador's *Reply* (Ecuador 2011, at para. 2.45) confuses the toxicity of pure POEA with that of the mixture as used for spraying. The complete lack of significant oral, dermal, and inhalation toxicity of the spray mixture (Table 1) demonstrates that the exposures from the diluted spray are below the threshold of toxicity."

Dr Solomon adds further:

> "POEA consists of ethoxylated tallow-amines and is made from the natural product, tallow (animal fat). As a result, POEA consists of a mixture of products with differing chain of the fatty-acid "tail", i.e. the "blend" referred to in Ecuador's *Reply* (Ecuador 2011, at para. 2.48). This is characteristic of POEA and tallow itself. Tallow is animal fat and, despite being a blend, is not toxic to humans. Slight differences in chain-length have little impact on toxicological properties and the potency of the mixture is considered in the toxicity tests discussed

---

[120] See Giesy *et al*., CCM, Vol. III, Annex 124. See also: CCM, Vol. III, Annexes 116 (CICAD I), 125, 126, and 131 (CICAD II).

[121] CR, Vol. II, Annex 4: Dobson Report (2011), para. 33.

above so the implication that the product is a blend is not relevant."[122]

2.73. Dr Dobson's report contains similar statements.[123]

2.74. Ecuador also claims that, in addition to POEA, other "formulants" are present in the spray mixture that Colombia has not fully disclosed. As an example, Ecuador points to "an unnamed ingredient" with regard to which the 2002 EPA Analysis redacted certain information as to its ingredients stating that: "information is not included as it may be entitled to confidential treatment".[124] However, despite the sinister impression Ecuador attempts to convey on the basis of this statement, this is a formal confidentiality determination in relation to that information of the type that the EPA is required under US law to issue when a formulation is entitled to confidentiality treatment. In other words, this is a reference to the fact that the data regarding this commercial product ought to be protected as its disclosure would be likely to cause competitive harm to the business that owned the information.[125] This is the reason why the EPA could not divulge this information and not because Colombia, or for that matter the EPA – which do not own such data – refused to disclose the information, as Ecuador alleges.

---

122 CR, Vol. II, Annex 3: Solomon Report, paras. 13-14.

123 CR, Vol. II, Annex 4: Dobson Report (2011), para. 33.

124 ER, para. 2.48.

125 See CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 5, p. 3.

2.75. In any event, the fact that some of the information regarding certain ingredients is confidential is irrelevant for present purposes since, whatever the information that the manufacturer sought to keep confidential, the scientific evidence and the reports of the US State Department in consultation with the EPA show that the spray mixture did not and does not pose significant risks to human health, animals or the environment. The risk assessment was based on the formulation used and therefore would cover also Ecuador's "unnamed ingredients", assuming, *quod non*, that any such ingredients existed.

2.76. Ecuador depicts the spray mixture used by Colombia as an imaginary cocktail of chemicals and seeks to corroborate its assertions with statements made by Colombia at various times. It is thus alleged that the mixture contains, in addition to the ingredients revealed by Colombia: dioxin, dioxane, formaldehyde, an "anti-foaming additive" called COSMO IN D, and a second unnamed additive, allegedly used to minimize foaming, all of which are said to be extremely toxic for human health. [126]

2.77. As to the alleged use of dioxin, Ecuador relies on a Note Verbale sent by Colombia to Ecuador on 14 July 2001 stating that the spray mixture contained dioxin.[127] No reference to dioxin is made in any of the contemporaneous documents of different entities that describe the formula of the spray

---

126 ER, paras. 2.57-2.61.

127 ER, para. 2.58. The letter is reproduced at EM, Vol. II, Annex 42.

mixture.[128] This reference was clearly the result of a typographic error. The Note Verbale could not have been referring to dioxin because this substance is not a component of the mixture, is not produced commercially and has no known uses.[129] In this regard, Dr Dobson notes the following: **"**Neither dioxin nor polyhalogenated dioxins would, or could, ever have been added to glyphosate formulations. Since neither glyphosate itself nor the other components of the formulation contain chlorine or bromine, their accidental production is also impossible."[130] He concludes: "It is absurd to suggest that dioxin was ever included in glyphosate formulations and disingenuous to ascribe the toxicity of halogenated dioxins to dioxin."[131]

2.78. The Note Verbale of 14 July 2001 was referring to dioxane, which is a common solvent, also mentioned by Ecuador as one of the "hidden" ingredients of the spray mixture. The amount of dioxane contained in the mixture used in Colombia's aerial eradication program is so insignificant that it can pose no danger for human or animal health. As noted in the

---

128 CR, Vol. IV, Annex 41: List of External Environmental Audits by the National Narcotics Directorate (DNE).

129 As noted in a WHO fact-sheet on dioxin, « Dioxins are mainly by products of industrial processes but can also result from natural processes, such as volcanic eruptions and forest fires. Dioxins are unwanted by products of a wide range of manufacturing processes including smelting, chlorine bleaching of paper pulp and the manufacturing of some herbicides and pesticides. In terms of dioxin release into the environment, uncontrolled waste incinerators (solid waste and hospital waste) are often the worst culprits, due to incomplete burning. Technology is available that allows for controlled waste incineration with low emissions." See http://www.who.int/mediacentre/factsheets/fs225/en/ (Last visited 10 Nov. 2011)

130 CR, Vol. II, Annex 4: Dobson Report (2011), para. 35.

131 *Ibid*., para. 36.

Note Verbale of 14 July 2001, the quantity of dioxane present in the spray mixture is "100 times below WHO and FAO standards, so there is no reason for concern regarding human or animal health."[132] Dr Dobson observes that dioxane "would be present in the formulation in very small amounts" and "will not cause adverse health effects as a minor component of the glyphosate spray."[133]

2.79. Formaldehyde was already covered in Dr Dobson's report filed with Colombia's *Counter-Memorial*.[134] There is no evidence that this chemical is present in the mixture and Ecuador has not produced any evidence in support of its allegations. No reference to the use of formaldehyde in the formula was found in the hundreds of documents by different Colombian entities reviewed. In any event, as noted by Dr Dobson in his first report, any presence of this component "in low volume would not be manifest as risk." Dr Solomon notes in his report that the hazard from formaldehyde "was <u>not</u> determined by WHO/FAO Joint Meeting on Pesticide Specifications to be toxicologically significant."[135]

2.80. As to Ecuador's allegation that the spray contains an "anti-foaming additive" called COSMO IN D,[136] it would be extremely unlikely that an anti-foaming agent would be toxic to human and animal health. COSMO IN D is on an EPA list of

---

132 EM, Vol. II, Annex 42.
133 CR, Vol. II, Annex 4: Dobson Report (2011), para. 34 .
134 CCM, Vol. I, Appendix: Dobson Report (2011), para. 20.
135 CR, Vol. II, Annex 3: Solomon Report, para. 20 (emphasis added).
136 ER, para. 2.61.

acceptable chemicals "for use on food crops when the label instructions are followed".[137] The substances contained in COSMO IN D, according to a safety data sheet issued by the company Cosmoagro, are mild skin and eye irritants along the same lines as the other surfactant components of the glyphosate formulations.[138] One of the substances in question, polyoxyethylene alkyl ether, for instance, is used extensively in cosmetics as an emulsifier and thus can hardly be considered to be toxic. In fact, there is no significant toxicity associated with COSMO IN D, particularly since, if it had in fact been included in the formulation at all, it would have been further diluted in the formulation.[139]

(d) Ecuador's allegations of use of Roundup Export and Roundup Ultra

2.81. Ecuador alleges that Colombia used Roundup Export and Roundup Ultra in addition to Roundup SL and GLY-41.

2.82. There is nothing in the record proving that Roundup Export was actually used in the Colombia aerial spraying eradication program. What we do know is that identical products can share the same EPA Registration Number.

2.83. For a product to have an EPA Registration Number, the following determination must be made by the EPA under the

---

137 ER, Vol. III, Annex 42, CRS-25.

138 Safety Data Sheet for COSMO IN D. Available at: http://www.resusa.co.cr/images/material/Coadyuvantes/Cosmo%20In%20d%2027%20SL/Hoja%20Seguridad%20Cosmo-In%20d.pdf (Last visited 10 Nov. 2011).

139 CR, Vol. II, Annex 3: Solomon Report, para. 21.

Federal Insecticide, Fungicide and Rodicide Act ("FIFRA"), that:

> "(A) the product's composition is such as to warrant the proposed claims for it;
>
> (B) the product's labelling 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 for 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.)"[140]

2.84. Further, in case of herbicides with identical or substantially similar chemical composition, only the first manufacturer which registers a product submits toxicity studies, while any subsequent manufacturer is exempted from this requirement.

---

[140] CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 7, p. 4.

2.85. In the case of Roundup Export, this product has the same EPA Registration Number as Roundup SL and Fuete SL (Registration Number 524-308). The following commercial products are encompassed under this EPA Registration Number: Roundup Export (primary name),[141] Roundup SL Herbicide,[142] Fuete SL Herbicide,[143] Roundup RT, Pondmaster Aquatic Herbicide, Mon-2139 Herbicide[144] and Roundup Super Concentrate. The US company Monsanto submitted an impressive number of scientific studies, 560, in support of the registration of the product with these different brand names.[145]

2.86. Similarly, Roundup Ultra has the same EPA Registration Number as Gly-41 (Registration Number 524-475). This Registration Number encompasses the following commercial products: Gly-41 Herbicide, Roundup Ultra Herbicide, Roundup Ultra RT Herbicide, Roundup PRO Herbicide, Roundup Original II CA, Mon 77360 Herbicide, Roundup W Herbicide and Gly 41 Herbicide.[146]

2.87. Thus, it is obvious that the herbicides mentioned by Ecuador, i.e., Roundup Export and Roundup Ultra, are

---

141 ER, Vol. IV, Annex 112.

142 Available at: http://www.epa.gov/pesticides/chem_search/ppls/000524-00308-20011115.pdf (p.1) (Last visited 10 Nov. 2011)

143 Available at: http://www.epa.gov/pesticides/chem_search/ppls/000524-00308-20020219.pdf (p. 2) (Last visited 10 Nov. 2011)

144 ER, Vol. IV, Annex 112.

145 The bibliography of these studies is reproduced under CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011

146 Available at: http://www.epa.gov/pesticides/chem_search/ppls/000524-00475-20100128.pdf (p. 3) (Last visited 10 Nov. 2011)

toxicologically the same product and their denominations simply correspond to the different commercial names under which the products used in Colombia are sold.

2.88. Roundup Export was tested by the US EPA and found to be in compliance with the EPA's requirements. Ecuador bases its allegation that the product is highly toxic on the fact that its label states: "Not Registered for use in the United States of America".[147] However, this statement is a commercial or marketing indication that has nothing to do with the toxicity of the product. It is an indication from the manufacturer as to whether the product is intended for domestic sale or for export. As explained by the EPA in the document attached at Annex 55,

> "*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 (…). 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."[148]

---

147 ER, para. 2.19.

148 CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011. Answer to Question 6, p. 3.

2.89. Ecuador's *Reply* provides a misleading interpretation of the EPA 2002 review when it suggests that the words used in the label of Roundup Export – "causes irreversible eye damage" – were among the EPA's "reasons for concluding that the spray was so dangerous" and for recommending that it be replaced with another glyphosate product with lower potential for acute toxicity. [149] The actual conclusions of the EPA review, which go unmentioned by Ecuador, were quite different. They read as follows:

> "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 is expected for workers loading and mixing the concentrated glyphosate product."[150]

2.90. Thus, the review unequivocally concluded that the components of the spray mixture pose no risk of significant adverse effects for human health.

---

[149] ER, para 2.21 and ER, Vol. III, Annex 45.

[150] CR, Vol. IV, Annex 53-A : Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Executive Summary, Consultation Review of the use of pesticide for coca eradication in Colombia, Section Findings, p. 10 (emphasis added).

2.91. Moreover, nowhere in its analysis does the EPA state that Roundup Export was being used. On the contrary, the EPA stated as follows:

> "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*.
>
> 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."[151]

2.92. This passage is strikingly different from Ecuador's self-serving interpretation. The EPA's clear conclusion is that

---

[151] See CR, Vol. IV, Annex 53-A: Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Consultation Review of the use of pesticide for coca eradication in Colombia, Section Risk Characterization, pp. 30-31 (emphasis added).

glyphosate presents no risks by the dermal or oral routes of exposure since toxicity is very low. The only area of concern regarded the *concentrated glyphosate product*, due to an inert ingredient present in the mixture, which caused potential risks of eye irritation *for mixers and loaders of the concentrated product*. It was on the basis of this concern that the EPA recommended to switch to a product with lower toxicity.

2.93. The EPA also noted in its 2002 review that there might be a correlation between the surfactant used in the formulated glyphosate product and "reported incidents of ocular effects". It however also emphasized that there had been a significant drop in illnesses involving the eye since 1992 and noted that: "[t]he 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."[152] It is therefore on the basis of a potential for eye damage of the *concentrated* (i.e. undiluted) glyphosate formulation due to *direct* exposure that the EPA recommended considering "an alternative glyphosate product (with lower

[152] CR, Vol. IV, Annex 53-A: Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Consultation Review of the use of pesticide for coca eradication in Colombia, Section I, Sub – section Exposure, p. 17.

potential for acute toxicity) in future coca and/or poppy aerial eradication programs."[153]

2.94. As to the alleged use of Roundup Ultra, Ecuador relies on representations made by Colombia on two occasions: i) with a diplomatic note addressed by the Colombian Ministry of Foreign Affairs to its Ecuadorian counterpart on 14 July 2001, and ii) at a bilateral meeting with Ecuador held on 13-15 February 2002.[154] On both occasions, reference was made to the fact that the registered name of the spray formulation was Roundup Ultra, a product manufactured by Monsanto and that this formulation would be replaced in future with Roundup SL. As noted above, Roundup Ultra has the same EPA Registration Number of, *inter alia*, Roundup SL and Gly-41. As stated by the EPA:

> "The product that is sold under these alternate brand names must be identical in ingredient formula composition and labelling 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 labelling of a product sold under an alternate brand name."[155]

---

153 CR, Vol. IV, Annex 53-A: Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, Consultation Review of the use of pesticide for coca eradication in Colombia, Section I, Sub – section Exposure, p. 17.

154 ER, paras. 2.24-2.26.

155 CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, Answer to Question 2, p. 2.

2.95. Thus, this is a distinction without a difference as Roundup Ultra is just another commercial name under which the same glyphosate-based product is sold in the United States.

(3) THE STATE DEPARTMENT REPEATEDLY CERTIFIED THAT THE SPRAY MIXTURE DOES NOT POSE UNREASONABLE RISKS OR ADVERSE EFFECTS TO HUMANS OR THE ENVIRONMENT

2.96. Subsequent to the 2002 technical review by the EPA, there was a series of other reviews and consultations between the EPA and the US State Department regarding whether the herbicide mixture conformed with the labelling parameters of comparable herbicides used in the United States. This took place in connection with the consultations between the State Department and the EPA for the purposes of certification under the Foreign Operations, Export Financing and Related Programs Appropriations Act 2002 and subsequent similar legislation.[156]

2.97. On each of these occasions, which took place between 2002 and 2008 and were discussed in Colombia's *Counter-Memorial*[157] (but are entirely ignored by Ecuador in its *Reply*), the US Secretary of State certified, in closely similar wording, that: "the herbicide mixture, in the manner that it is being used, does not pose unreasonable risks or adverse effects to humans or the environment."[158]

---

156 See above, fn. 39.

157 CCM, para. 7.51.

158 See CR, Vol. IV, Annex 53: Memoranda of Justification by the United States Department of State, 2002-2008.

2.98. This evidence – some of which is contemporary to the harm allegedly caused to Ecuadorian nationals as reported in the witness statements submitted in these proceedings – disproves Ecuador's allegations that the mixture posed significant risks to human and animal health or the environment. Furthermore, this evidence also shows that – contrary to what is asserted by Ecuador – Colombia did take into account the EPA's recommendation in 2002 to use an alternative glyphosate product in the eradication program.[159]

2.99. As discussed above, it is clear from the record that the recommendation made by the US EPA in 2002 to switch to an alternative glyphosate product was suggested as a precautionary measure for the people exposed to direct contact with the mixture. In the Memorandum of Justification Concerning the Aerial Eradication of Coca and Opium Poppy in Colombia published in December 2003, the State Department specifically stated 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."[160] The State Department added that it did "not believe that the recommendation was intended to indicate any potential risk to persons exposed to the spray mixture as actually applied by

---

[159] ER, para. 2.23.

[160] CR, Vol. IV, 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, Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia, Section 1. (B) The herbicide mixture is being used in accordance with any additional controls recommended by the EPA for this program.

the spray aircraft." Again, this last statement clearly referred to persons exposed to overspray and not to potential spray drift.

2.100. The most recent Memorandum of Justification concerning the Secretary of State's certification of the conditions of Colombia's coca eradication program, issued in 2008, maintained – in line with previous certifications – that the herbicide mixture was used in accordance with EPA label requirements for comparable use in the United States and in compliance with Colombia's Environmental Management Plan for aerial eradication.[161]

2.101. Several conclusions flow from this evidence.

2.102. First, the US Secretary of State determined and certified in substantially similar form in every year from 2002 to 2008 "that the mixture, in the manner it is being used, does not pose any unreasonable risks or adverse effects to humans or the environment."[162]

2.103. Second, to the extent that risks exist of eye damage and skin irritation when using the glyphosate product, these risks concern the undiluted formulation and not the spray mixture and may only result from direct application of the product. Thus, the group that may have been at risk from contact with the mixture

[161] CR, Vol. IV, 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.

[162] CR, Vol. IV, Annex 53: Memoranda of Justification by the United States Department of State, 2002-2008.

were the individuals who mix and load it, i.e. the pilots and the mechanics who service the airplanes that conduct the sprayings.

2.104. Third, even in the case of mixers and loaders of the product, no incidents were ever reported,[163] and any concerns that might have existed were significantly mitigated in 2003 – and not in 2005 as Ecuador alleges[164] – when the formulation was changed to a product having lower toxicity.

2.105. Consequently, the reported harm which Ecuador claims its nationals have experienced following spraying episodes cannot be caused by mere spray drift of the mixture – even assuming (*quod non*) that spray drift occurred – in the course of the aerial eradications pursued by Colombia over Colombian territory.

2.106. While the question of spray drift will be discussed in more detail in the following section, it should be noted here that both the 2002 and 2003 Memoranda of Justification concluded that the eradication program "takes appropriate measures to minimize off target drift", and recognized that it was "employing Best management Practices to minimize drift."[165]

---

[163] CR, Vol. IV, 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. Nov. to 4 Dec.2004, 7 Dec. 2004, p. 14.

[164] ER, para. 2.23.

[165] See: Annex CR, Vol. IV, Annex 53-A: Department of State Memorandum of Justification Concerning Determination on Health, Environmental, and Legal Aspects of Coca Eradication in Colombia, 2002, Response from EPA Assistant Administrator Johnson to Secretary of State, August 19, 2002, Sub-section VIII Spray Drift, p. 24. See also: Annex CR, Vol. IV, Annex 53-B: Department of State Certification Related to Aerial Eradication in Colombia Under the Andean Counterdrug Initiative Section of

Similar findings were made by the subsequent Memoranda of Justification produced in 2004, 2005, 2006, 2007 and 2008.[166]

(4) CONCLUSIONS ON THE SPRAY MIXTURE

2.107. There is accordingly no mystery about the spray mixture, and Ecuador's allegations of secret harmful ingredients are wholly without foundation. Furthermore, such allegations are in any event irrelevant for the present case, since the formula has also been the object – as a whole and in its individual components – of a number of studies, analyses and toxicological tests on animals, soil and water.

2.108. Indeed, the mixture and some of its individual components have been tested by the US EPA, the US Department of State, and by independent scientific studies such as those carried out for CICAD. The conclusions reached by these different tests and studies are the same: no significant risk

---

the Foreign Operations, Export Financing, and Related Programs Appropriations Act, Division E, Consolidated Appropriation Resolution, 2003, EPA comment regarding spray drift, at p. 7: "The herbicide mixture, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment."

[166] CR, Vol. IV: 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, p. 5; Annex 53-D: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2005, p. 2; Annex 53-E: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2006, p. 2; 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, p. 2; 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, p. 4.

of harm to human and animal health and the environment is posed by either the spray mixture as a whole or any of its components.

2.109. Likewise, in the course of the implementation of the PECIG, officials from various Colombian agencies and entities – among them, those charged with verifying compliance with the EMP which includes verification of the formula used and its effects – participate in field audits and monitoring. They include officials from the General Prosecutor's Office, the Ministry of the Environment, the ICA, the Anti-Narcotics Police ("DIRAN"), the Agustín Codazzi Geographic Institute ("IGAC"), the Institute of Meteorology and Environment ("IDEAM") and, when necessary, the Autonomous Regional Corporations ("CARs"), as well as members of universities. These audits and monitoring have consistently shown that the spray mixture does not cause adverse effects on human health or the environment.

2.110. In an effort to provide some credence to its accusations, Ecuador selectively picked and chose from the information in its possession and conveniently ignored or dismissed the studies that run directly against its allegations. However, Ecuador's case falls away when it is confronted with the entirety of the record and with the existing scientific evidence.

2.111. For all the reasons set out above, Ecuador's allegations that the mixture is highly toxic and causes significant harm are utterly misplaced and unfounded.

C. The Issue of Drift

2.112. As stated in the Introduction, the subject of the dispute is whether as a result of the spraying operations conducted in Colombian territory close to the border, a significant amount of herbicide was deposited in Ecuador so as to cause damage. This scenario involves two assumptions: (a) that the spray mixture by reason of its toxicity can cause significant damage to humans, animals and the environment; (b) that the method by which spraying was conducted was at the relevant times such as to cause or permit the spray mixture to enter Ecuadorian territory in relevant quantities. The former assumption is simply untrue, as demonstrated in section B above. The latter assumption is also untrue, as will be demonstrated in this section.

2.113. Generally, it has been determined that within 300 metres there is no question of significant deposition susceptible of causing damage, as a result of drift, since less than 3.7 g/ha would reach the ground at that distance, even in the event of multiple spray lines.[167] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and 36-1,958 g/ha for various crops.[168] Thus, at very short distances downwind of the application site, even the over-

[167] CR, Vol. II, Annex 1: Dr A.J. Hewitt, Ph.D., *Response to Report "Spray Drift Modeling of Conditions of Application for Coca Crops in Colombia" by D.K. Giles*, *Jan. 2011"*, 1 Nov. 2011 (hereinafter: Hewitt Report – Response to Giles (2011)), paras. 25-28, pp. 10-12.

[168] *Ibid.*, para. 8, p. 5; CCM, Vol. III, Annex 131-B, p. 927.

protective value of 4.1 g/ha suggested by Ecuador's expert, Dr Weller, is not exceeded.[169]

2.114. Indeed, "levels of drift downwind of the spray applications rapidly approach zero within a few hundred metres and are well below levels of concern for exposure to sensitive areas".[170] According to Dr Hewitt, even Dr Giles, in his modeling – which is flawed due to the fact that it assumes no canopy and assumes many other counter-factual factors so as to maximize the expected spray drift – acknowledges that deposition of glyphosate "fall[s] to less than 1 g/ha by 10 km downwind."[171] This is a *de minimis* amount, the broad equivalent of distributing a pinch of salt (approximately 1/5 of a teaspoon) over an area the size of a soccer field (90 m x 120 m).

2.115. Moreover, Ecuador assumes a variety of factors so as to maximize the expected deposition from spray drift, whilst ignoring a number of other relevant variables. In order to determine the true extent of drift, variables that have a strong impact in reducing drift, notably the forest canopy and terrain elevations, need to be properly taken into account.

2.116. In responding to Ecuador's misleading account in the *Reply* of the various variables affecting drift, the relevant spray events will be examined in the light of the following variables:

---

[169] ER, Vol. II, Annex 3, p. 14. See also, CR, Vol. II, Annex 4: Dobson Report (2011), paras. 4-5, 30, 66.

[170] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

[171] *Ibid.*, para. 24, p. 10.

forest canopy; speed and height; droplet size; application rate; temperature, humidity and wind conditions; and time of day.

2.117. A total of 4,128[172] spray events took place within 1 km from the border. For all the relevant variables, it is sufficient to analyse only the closest spray events for the purpose of showing that deposition in Ecuador due to drift would have been zero or, at most, insignificant and could not have resulted in the adverse effects complained of by Ecuador. Only the closest spray events are taken since, given the distances involved, spray events located farther into Colombian territory are irrelevant for the analysis.

2.118. The effect of multiple spray lines has also been accounted for by Dr Hewitt, and is insignificant at all distances in the drift zone downwind.[173] Deposition is not multiplied eight-fold as is erroneously suggested by the Giles Report. Indeed, when the effect of canopy in intercepting drift is considered, the deposition rates are much lower than those identified by Dr Giles.[174]

2.119. The Amazon region is characterized by undulating terrain with elevations ranging between 30 and 100 metres. Those elevations are also present along the banks of the

---

[172] CR, Vol. II, Annex 5: A. Tait, International Mapping Associates, *Statistical Summary of Data for Spray Events Within the Relevant Area Along the Border between Colombia and Ecuador*, Dec. 2011 (hereinafter: IMA Report (2011)), para. 2.4, p. 2.

[173] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), paras. 25-28, p. 12.

[174] *Ibid.*, paras. 11-15. pp. 5-6.

Putumayo and San Miguel border rivers. These elevations similarly act as natural barriers further minimizing drift.

2.120. Likewise, Ecuador's misleading portrayal of the Program's management and pilots' training and performance, in an attempt to magnify its hypothetical drift arguments, is also rebutted by, among others, contemporaneous documents furnished to Ecuador by the State Department under FOIA, which Ecuador opted not to include with its *Reply*.[175]

(1) FOREST CANOPY

2.121. The Ecuador-Colombia border region is tropical rainforest with a high tree canopy, as acknowledged by Ecuador's own experts:

> "The canopy height of the rainforest in the Ecuador-Colombia border region is in the range of 30 to 35 metres. Emergent trees may extend even higher, reaching 50 or even 65 metres above ground (Balslev, 2010)."[176]

Balslev provides the following photographs:

---

175 See below paras. 2.171-2.202.

176 ER, Vol. II, Annex 1, p. 10.

Figure 2-1 Lowland Amazon Rain Forest in Ecuador, showing the different layers of the forest. (Source: H. Navarrete).[177]

Figure 2-2 View of the rainforest canopy from above (Source: Wolfgang Kaehler/Picade)[178]

177 ER, Vol. II, Annex 4, p. 8.

178 *Ibid.*, p. 9.

Figure 2-3 The tropical rain forest near the Colombia-Ecuador border at its eastern extreme near Güeppi [sic] (Source: Alverson et al. 2008).[179]

2.122. The modeling performed by Dr Giles in support of the *Reply* ignores this clear indication that the presence of canopy was of critical importance. All his modeling assumes no canopy. As confirmed by Dr Hewitt in his report:

> "[…] assessments by Giles of the effect of aircraft height on spray drift have ignored the significant canopy downwind of the spray applications which would effectively filter out any airborne spray drift. It is not appropriate to model these applications with an aircraft flying above little or no canopy when the region includes significant canopy and structures."[180]

---

179 ER, Vol. II, Annex 4, p. 11.

180 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 14, p. 6.

2.123. This is of particular importance given the following explanation provided by Dr Hewitt:

> "The Giles Report presents some interesting scenarios for studying the sensitivity of spray drift to a range of variables associated with the application of sprays by aircraft. However, the assessments are not presented in the context of the actual canopy present in Colombia which will act as an efficient filter of any airborne droplets that do not deposit on the ground beneath the aircraft... When the canopy is appropriately entered into the AGDISP model, levels of drift downwind of the spray applications rapidly approach zero within a few hundred metres and are well below levels of concern for exposure to sensitive areas."[181]

2.124. In his analysis for the purposes of the CICAD II study, Dr Hewitt had already pointed out the importance of canopy in reducing drift:

> "The extensive vegetation of the forest canopy and environment around the area where the coca and poppy plants are sprayed in Colombia will afford excellent reductions in spray drift potential by interception of droplets with leaf and other surfaces (Raupach et al., 2001). This will greatly reduce the spray drift exposure risk from the values reported in this study by 50-90% (AgDRIFT, 2008)."[182]

This means that the spray will encounter canopy which will then intercept 50-90% of the spray drift. And even when the spray does reach vegetation as opposed to bare ground, it will be intercepted by the foliage.

---

[181] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, pp. 13-14.

[182] CCM, Vol. III, Annex 131-B, p. 928.

2.125. Dobson also points out in his report the erroneous basis on which Ecuador's experts built their theory on drift, given that they ignore the presence of forest canopy, an essential feature of the relevant area:

> "In their Section 1, Menzie & Booth (2011) rely on the modeling by Hansman & Mena (2011) and Giles (2011) presented in the *Reply* of Ecuador (2011). The paper presented by Hewitt (2011) in the Colombian response demonstrates that the assumptions made by Ecuador's experts do not apply to spraying where there is a significant forest canopy. If the canopy is taken into account, drift is hugely reduced and the suggested values for deposition at distance from the spraying are reduced by many orders of magnitude. The suggestion that the original assessment by Menzie et al. (2009) is vindicated is, therefore, erroneous."[183]

2.126. Moreover, the undulating terrain of the Amazon region, with elevations ranging between 30 and 100 metres, also acts as natural barriers further minimizing drift. The following photograph (Figure 2-4) taken in Putumayo, shows terrain undulations and the high tree canopy that characterize the area. Clearly visible are the clearings where trees have been felled to grow coca crops, as well as the surrounding vegetation which is unaffected following the sprayings. The natural barrier effect afforded by the height of the trees present in the area can also be seen:

---

[183] CR, Vol. II, Annex 4: Dobson Report (2011), para. 31, p. 13.

Figure 2-4 Putumayo, aerial view.

2.127. Those elevations are also present along the banks of the border rivers, as shown in Figures 2-5 and 2-6.

Figure 2-5 Putumayo River and Coembí confluence.

Figure 2-6 Putumayo River, Puerto Ospina – Güepi segment.

(2) AIRCRAFT SPEED AND HEIGHT OF SPRAY RELEASE

2.128. It should be noted at the outset that, contrary to Ecuador's assertion, Colombia did not agree in its *Counter-Memorial* that the higher the aircraft speed and height of spray release, "the more likely it [the spray] is to drift *long distances*."[184] Nor did Colombia agree that aircraft speed is "the principal factor that determines whether there will be long-distance drift."[185] Both issues, speed and height, will be addressed in turn in the following paragraphs.

(a) Speed

2.129. First, aircraft speed is but one of many variables that may influence drift. There are others, as noted by Dr Hewitt, which Ecuador has failed to take into account, and which actually reduce drift significantly. Among these are the presence of vegetation and structures both surrounding and downwind of the spray applications, which act as receptors for airborne droplets, thereby preventing their off-target movement as drift.[186] Ecuador ignores the significant canopy downwind of the spray applications which effectively filters out any airborne spray drift.[187] Ecuador also conveniently chooses to ignore the fact that the predominant direction of the wind in the border area is from south to north, i.e. from Ecuador towards Colombia, and

---

184 ER, para. 2.87 (emphasis added).
185 ER, para. 2.88.
186 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), paras. 11-15, pp. 5-6.
187 *Ibid.*, para. 11, p. 5.

that the mean wind speeds are in the order of between 1 m/sec and 2 m/sec, i.e., 3.6-7.2 km/h.[188]

2.130. Ecuador analysed the spray data provided by the United States' State Department, by generating a sub-set of spray events comprised within 10 km of the border. However, as clearly stated by Dr Hewitt in CICAD II, at a speed of 333 km/h (207 mi/h) and "an RH [relative humidity] of 90% which is more typical of the conditions that occur in the Nariño and Putumayo areas in the SW part of Colombia," "the majority of the active ingredient (>90%) deposits within 100 metres of the swath edge."[189] There is no question of significant deposition susceptible of causing damage, as a result of drift, since at 300 metres from the edge of the spray swath, the deposition rate is less than 3.7 g/ha, and levels of drift "rapidly approach zero within a few hundred meters and are well below levels of concern for exposure to sensitive areas".[190] By way of contrast, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha for deposition over water 15cm deep; and between 36 and 1,958 g/ha for various crops.[191]

2.131. On this basis the sub-set of spray events comprised within 10 km of the border is both extravagant and irrelevant for

---

[188] CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011, Vol. II pp. 702, 706-730.

[189] CCM, Vol. III, Annex 131-B, p. 925.

[190] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

[191] *Ibid.*, para. 8, p. 5; CCM, Vol. III, Annex 131-B, p. 927.

the purposes of the present case. But Colombia will, in the interest of completeness, analyse the highest recorded speed and the spray events closest to the border or the river bank on the Ecuadorian side of the border, in order to show that even for those spray events, drift could not have resulted in any of the damage complained of by Ecuador.

2.132. Given that the highest of the speeds modeled by Dr Hewitt was 333 km/h (207 mph), for the present analysis, only the events exceeding that speed in the years 2000-2007 are of any relevance as potentially capable of affecting his conclusions. Of the spray events for which data was recorded,[192] there were 356 spray events with a speed above 333 km/h (207 mph)[193], but of those, 189 (53%) are very close to that speed (no more than 5 mph faster)[194], and thus Dr Hewitt's earlier values can be taken as applying. More importantly, even the highest recorded speed, 36 miles above the 207 mph figure,[195] could only cause drift resulting in the deposition of 0.76 g/ha at 807 metres downwind.[196] As such, even the few cases in which spray events took place at faster speeds than the 207 mph figure are not susceptible to cause the adverse effects alleged by Ecuador.

---

192 These were 3,917 spray events. CR, Vol. II, Annex 5: IMA Report (2011), para. 4.2, p. 6.

193 *Ibid.*, Table 3, p. 6.

194 *Ibid.*

195 *Ibid.*

196 CR, Vol. II, Annex 2: Dr A.J. Hewitt, Ph.D., *Aerial Spray Drift Modeling of Plan Colombia Applications*, 1 Nov. 2011 (hereinafter: Hewitt Spray Events Modeling (2011)), pp. 4-5, Table of Model Results, row 15.

2.133. In the years 2003, 2004, 2006 and 2007, there were no spray events with speeds of over 333 km/h (207 mph).[197] For each of the other years, 2000-2002 and 2005, Colombia requested Dr Hewitt to run the AGDISP model used by both Hewitt and Giles, in order to model drift and resulting deposition for the spray event with the highest recorded speed closest to the border or the river bank on the Ecuadorian side of the border.[198]

2.134. In 2000, there were 4 such spray events.[199] The event with the highest speed was 209.72 mph, which took place at an altitude of 42.76 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 1,225 metres. The event closest to the border of the fastest events within the relevant area had a speed of 209.45 mph, and took place at an altitude of 51.33 metres above ground level. The distance to the river bank on the Ecuadorian side of the border for that event was 1,153 metres.[200] In both cases the spray events are thus more than 1,000 metres from the Ecuadorian territory. However, as Dr Hewitt states, the levels of deposit downwind "rapidly approach zero within a few hundred meters."[201] As such, there could have been only minimal deposition resulting

---

197 CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6.

198 Certain records showed values of zero in the fields for application rate (Spray Rate or Volume, depending on the year). However, in the interest of completeness, for those records that showed values of zero, Colombia will use 23.65 l/ha (6.25 gal/ha), which is the parameter of the EMP, instead of the 21.65 l/ha (5.7 gal/ha) average (See below para. 2.211), for purposes of drift and deposit calculations.

199 CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6.

200 *Ibid.*, Table 5, p. 8.

201 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

from these events, and drift could not have resulted in any of the damages complained of by Ecuador. Dr Hewitt confirmed this conclusion after modeling these events and estimating deposition values of 0.28 g/ha and 0.55 g/ha, respectively.[202]

2.135. In 2001, there were 21 events with speeds of over 333 km/h (207 mph).[203] The event with the highest speed was 224.04 mph, which took place at an altitude of 47.75 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 979 metres. As to the event closest to the border of the fastest events, it had a speed of 211.69 mph, and took place at an altitude of 37.41 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 728 metres.[204] In both cases the spray events occurred more than 700 metres from the Ecuadorian territory, and as such, drift could therefore not have resulted in any of the damages complained of by Ecuador. Again, as Dr Hewitt states, the levels of deposit downwind "rapidly approach zero within a few hundred meters."[205] Dr Hewitt's modeling of these events resulted in estimated deposition values of 0.56 g/ha and 0.38 g/ha, respectively.[206]

---

[202] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), Table of Model Results, rows 37 and 27.

[203] CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6.

[204] *Ibid.*, Table 6, p. 8.

[205] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

[206] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 26 and 31.

2.136. In 2002, the spray data from the US State Department shows 203 events above 333 km/h (207 mph).[207] The highest recorded speed was 242.9 mph, with an altitude of 50.4 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 807 metres. Likewise, the event closest to the border of the fastest events was at a speed of 207.1 mph, at an altitude of 40.71 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 153 metres.[208] Dr Hewitt modeled these events and estimated deposition values of 0.76 g/ha and 0.70 g/ha, respectively.[209] In the circumstances, there was no significant deposition of spray mixture in Ecuadorian territory as a result of drift.

2.137. In 2005, there were 128 events above 333 km/h (207 mph).[210] The highest speed was 224.6 mph, which was the case for two events; of these, the highest was at an altitude of 43.97 metres above ground level, at a distance of 683 metres from the river bank on the Ecuadorian side of the border. Likewise, the event closest to the border of the fastest events took place at a recorded speed of 211.7 mph, at an altitude of 50.68 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 277 metres.[211] Dr Hewitt modeled these events and estimated deposition values of

---

207 CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6.

208 *Ibid.*, Table 5, p. 8.

209 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 15 and 17.

210 CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6.

211 *Ibid.,* Table 5, p. 8.

0.69 g/ha and 1.22 g/ha, respectively.[212] Again, deposition of the spray mixture in Ecuadorian territory as a result of drift was insignificant.

2.138. *All* of these amounts, ranging between 0.28 and 1.22 g/ha, are well below the levels of concern for sensitive animal and plant species. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; the level of concern ranges between 36 and 1,958 g/ha for various crops.[213]

2.139. Contrary to what Ecuador asserts, Colombia does not accept that "violations of the speed limit have a dramatic impact on spray drift."[214] First of all, aircraft speeds, such as those shown above from the spray data, do not constitute "violations" of the PECIG's operational parameters since aircraft speed is not included as such a parameter in the EMP.[215] Second, according to Ecuador, the purported "dramatic impact" relates to decreased droplet size. The technical reasons for this conclusion are explained by Ecuador's experts, Hansman & Mena, as follows: "If the spray aircraft airspeed is too high, the droplets from the spray nozzle will explode into much smaller droplets due to aerodynamic forces as they hit the high relative wind."[216] However, as stated by Dr Hewitt, "higher wind speeds often

---

212 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 19 and 8.

213 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; CCM, Vol. III, Annex 131-B, p. 927.

214 ER, para. 2.97.

215 CCM, Vol. II, Annex 50, Record No. 1, Chart 1, pp. 173-174.

216 ER, para. 2.97, quoting ER, Vol. I, Annex 1, p. 20.

produce greater dispersion in the atmosphere as noted through stability classes, and hence with greater dilution there can be lower deposition at far-field distances."[217] That observation is corroborated by the results of the modeling of spray events with high speeds set out above, in all of which deposition in Ecuador was insignificant.

2.140. Furthermore, the basis on which Ecuador purportedly supports its dramatic depiction of the incidence of aircraft speed on drift is erroneous, given that it ignores variables that must be factored in when accounting for that incidence, such as the existence of canopy surrounding and downwind of the spray application swath,[218] among others. *All* the fastest and closest spray events described above took place at altitudes ranging between 36 and 50 metres above ground level.

(b) Height of spraying

2.141. As in the case of speed, height is but one of a series of variables or factors that need to be jointly taken into account, together with other variables, including the presence of canopy, wind conditions, relative humidity, etc., for purposes of calculating drift and deposition.

2.142. As shown above, for instance, canopy acts as a natural barrier to drift; further, the typical relative humidity levels characteristic of the border area results in >90% of the spray

[217] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 31, p. 13.
[218] See above paras. 2.122-2.127.

mixture depositing within 100 metres of the swath edge;[219] also, wind conditions prevalent in the area are weak and mostly due north or east (i.e. away from Ecuador).[220]

2.143. Contrary to Ecuador's assertions,[221] Colombia has not misrepresented the existing requirements concerning height as an operational parameter included in its Environmental Management Plan, or its compliance with them. As Colombia stated in its *Counter-Memorial*,

> "The Environmental Management Plan foresees a maximum flight altitude of 50 metres when spraying, *subject to geographical features or obstacles so as to avoid risks to the pilots*."[222]

2.144. The Environmental Management Plan, in force since 2001 and as amended in 2003, reads as follows:[223]

> Chart # 1
>
> PROGRAM FOR THE ERADICATION OF ILLICIT CROPS BY AERIAL SPRAYING.
>
> OPERATIONAL PARAMETERS

PARAMETER	UNIT OF MEASURE	VALUE OR RANGE	VALUE OR RANGE
		COCA	POPPY
Flying Altitude	Metres	The highest application altitude will be 50 metres; notwithstanding, the operation will be conditioned to the height of the obstacles present in the target spray zones	

219 CCM, Vol. III, Annex 131-B, p. 925. As regards typical relative humidity conditions in the area, see below, paras. 2.220-2.23. See also, CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011, Vol. II pp. 698, 701.

220 CR, Vol. II, Annex 19, Vol. II pp. 702, 706-730.

221 ER, para. 2.98.

222 CCM, para. 4.62 (emphasis added).

223 CCM, Vol. II, Annex 50, p. 173.

2.145. Thus, 50 metres is the general rule, with which Colombia has complied (in 86% of spray events in the relevant area), as corroborated by the spray data provided by the State Department.[224] Even in Ecuador's analysis of a much broader (and not relevant) set of data, it is acknowledged that the 50m general rule was observed in 83% of the spray events.[225]

2.146. The EMP clearly and expressly allows pilots to fly above 50 metres, without any explicit limit, in order to avoid obstacles present in the targeted plots. These obstacles not only include man-made traps devised by drug traffickers such as attaching cables between scattered tall trees within the plot so as to endanger the aircraft;[226] the trees themselves, left within the plots by growers so as to impair crop detection from above and to prevent the planes from descending over the plots to carry out the sprayings, as shown in Figure 2-7, often prove to be obstacles since, as Ecuador acknowledges, average tree canopy in the Ecuador-Colombia border area ranges between 30-35 metres, with emergent trees growing as high as 50 or even 65 metres.[227]

---

224 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.
225 ER, Vol. I, Annex 1, p. 19.
226 ER, Vol. IV, Annex 117, paras. 4, 6.
227 ER, paras. 2.112, 2.114; ER, Vol. II, Annex 1, p. 10.

Figure 2-7 Source: 2001 Verification Mission.[228]

2.147. According to the spray data for the relevant area there were 4,128 spray events between 2000-2007.[229] Of those 4,128 spray events, in 3,550 (that is, 86% of the time), the height at which the spray was released was 50 metres or less. Moreover, 12.8% of the spray events (527) took place within the range of 50-77 metres, consistent with the allowance for obstacles, explained above. Only 1.2% (51) of the spray events were

[228] This image is part of a set of photographs furnished to Ecuador by the U.S. Department of Agriculture in response to requests Nos. 09-039 and 09-040 (14, April 2009), submitted under the Freedom of Information Act (FOIA).

[229] Ecuador excluded 2001 and 2004 due to the fact that the units were mixed. Colombia has been able to determine the units for every spray line in those years. Ecuador alleges that "the number of violations of altitude criteria presented […] are an underestimate of the total number of altitude violations." (ER, Vol. I, Annex 1, p. 6). In fact, in 2001 and 2004, there were only 15 lines above 77 metres within 1 kilometre from the border. CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.

above 77 metres, and those spray events were, moreover, conducted at speeds ranging between 134 and 172 mph, i.e., substantially below the maximum speed modeled by Dr Hewitt in CICAD II, i.e. 333 km/h (207 mph). Accordingly, for this reason and those set out below, these spray events did not result in increased drift likely to cause significant deposition in Ecuadorian territory. On the contrary, as Colombia will show, deposition values were insignificant.

2.148. Colombia requested Dr Hewitt to run the AGDISP model, used by both Hewitt and Giles, in order to analyse drift and deposition of the spray event with the highest recorded altitude above ground level closest to the border or the river bank on the Ecuadorian side of the border.[230]

2.149. In 2000, there were 4 spray events above 77 metres.[231] The highest of such events was at an altitude of 160.26 metres above ground level. The distance to the border was 947 metres. The event closest to the border of the highest events within the relevant area was at an altitude of 142 metres above ground level. The distance to the border was 922 metres.[232] In both cases the spray events are close to 1,000 metres from the border. Dr Hewitt confirmed the conclusion that any deposition would have been insignificant after modeling these events; he

---

230 Certain records showed values of zero in the fields for application rate (Spray Rate or Volume, depending on the year). However, in the interest of completeness, for those records that showed values of zero, Colombia will use 23.65 l/ha (6.25 gal/ha), which is the parameter of the EMP, instead of the 21.65 l/ha (5.7 gal/ha) average (see below para. 2.211), for purposes of drift and deposit calculations.

231 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.

232 *Ibid.*, Table 10, p. 14.

estimated deposition values of 1.66 g/ha and 1.55 g/ha, respectively.[233] Therefore, drift could not have resulted in significant deposition, or in any of the damages complained of by Ecuador.

2.150. In 2001, there were 14 spray events above 77 metres.[234] The highest event within the relevant area was at an altitude of 113.83 metres above ground level. The distance to the Ecuadorian bank of the border river was 674 metres. The event closest to the border of the highest events within the relevant area was at an altitude of 112.76 metres above ground level. The distance to the border was 571 metres.[235] Dr Hewitt modeled these events and estimated deposition values of 1.45 g/ha and 1.46 g/ha, respectively.[236] In the circumstances, there could have been no significant deposition of the spray mixture as a result of drift in Ecuadorian territory.

2.151. In 2002, there were 23 events above 77 metres.[237] The highest event was at an altitude of 139.22 metres above ground level. The distance to the Ecuadorian bank of the border river was 585 metres. Likewise, the event closest to the border of the highest events within 1km had an altitude of 122.63 metres above ground level. The distance to the river bank on the

---

233 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 2 and 5.

234 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.

235 *Ibid.*, Table 10, p. 14.

236 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 7 and 6.

237 CR, Vol. II, Annex 5: IMA Report (2011), p. Table 8, p. 12.

Ecuadorian side of the border was 479 metres.[238] Dr Hewitt modeled these events and estimated deposition values of 1.66 g/ha and 1.59 g/ha, respectively,[239] which are insignificant and therefore could not have resulted in the damages alleged by Ecuador.

2.152. In 2003, there were no spray events over 77 metres.[240]

2.153. In 2004, there was 1 such spray event.[241] It was at an altitude of 138.28 metres above ground level. The distance to the border was 209 metres.[242] Dr Hewitt modeled this event and estimated a deposition amount of 1.15 g/ha.[243] Therefore, there could have been no significant deposition of the spray mixture as a result of drift in Ecuadorian territory.

2.154. In 2005, 4 spray events were above 77 metres.[244] The highest event was at an altitude of 107.87 metres above ground level. The distance to the river bank on the Ecuadorian side of the border was 704 metres. Likewise, the event closest to the border of the highest events had an altitude of 95.62 metres above ground level. The distance to the border was 464 metres.[245] In both cases the spray events were beyond 400 metres from the border, and as Dr Hewitt states, the levels of

---

238 CR, Vol. II, Annex 5: IMA Report (2011), p. Table 10, p. 14.
239 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 3 and 4.
240 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.
241 *Ibid.*
242 *Ibid.*, Table 10, p. 14.
243 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 12.
244 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.
245 *Ibid.*, Table 10, p. 14.

deposit downwind "rapidly approach zero within a few hundred metres."[246] Dr Hewitt modeled these events and estimated insignificant deposition values of 0.25 g/ha and 0.19 g/ha, respectively.[247]

2.155. In 2006, there was 1 spray event at an altitude of 87 metres above ground level.[248] The distance to the Ecuadorian bank of the border river was 1,145 metres.[249] In this case the spray event is beyond 1,000 metres from the border. Therefore, there could have been no deposition, and drift could not have resulted in any of the damages complained of by Ecuador. Dr Hewitt confirmed this conclusion after modeling this event and estimating a deposition amount of 0.3 g/ha.[250]

2.156. In 2007, 4 spray events were above 77 metres.[251] The highest event was at an altitude of 122.16 metres above ground level. The distance to the border was 964 metres. The event closest to the border had an altitude of 106.47 metres above ground level, and the distance to the border was 904 metres.[252] In both cases the spray events are around 1,000 metres from the border which resulted in no deposition in Ecuadorian territory.

---

246 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

247 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 39 and 43.

248 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.

249 *Ibid.*, Table 10, p. 14.

250 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 36.

251 CR, Vol. II, Annex 5: IMA Report (2011), Table 8, p. 12.

252 *Ibid.*, Table 10, p. 14.

Indeed, Dr Hewitt modeled these events and estimated deposition values of 1.17 g/ha and 0.94 g/ha, respectively.[253]

2.157. In conclusion, *all* of these amounts, ranging between 0.25 and 1.66 g/ha, are below the level of concern for sensitive animal and plant species. Indeed, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops,[254] even the over-protective value of 4.1 g/ha suggested by Ecuador's expert, Dr Weller, is not exceeded.[255] This explains why Ecuador has failed to provide any evidence in support of its baseless claims.

2.158. Ecuador states that "[t]he data generated by the spray planes and obtained from the U.S. State Department show that Colombia's violation of both altitude and speed limits simultaneously has been a common occurrence."[256] Ecuador bases this assertion on the basis of its analysis of spray events within a much broader – and not relevant – area and using altitudes that are not those foreseen by the Program's EMP.

2.159. This approach is flawed and misleading. As shown above, only 51 spray events (1.2%) in the relevant area are above 77 metres, i.e., as per the EMP 50-metre general rule except for obstacles, in this case, accounting for safe passage

---

253 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 11 and 14.

254 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; CCM, Vol. III, Annex 131-B, p. 927.

255 ER, Vol. II, Annex 3, p. 14. See also, CR, Vol. II, Annex 4: Dobson Report (2011), paras. 4-5, 30, 66.

256 ER, para. 2.107.

over emergent trees that can be as high as 65 metres. More importantly, the speeds for those 51 events ranged as follows: In the 4 events in 2000, the speed was between 151 and 167 mph. In the 14 events in 2001, the speed was between 150 and 163 mph. In 2002, the speeds of the 23 events ranged between 134 and 161 mph. In 2003, there were no such spray events over 77 metres within the relevant area. In the only event in 2004, the speed was 151 mph. Of the 4 events within the relevant area in 2005, the speeds ranged between 158 and 171 mph. In the single event for 2006, the speed was 172 mph. In the 4 spray events of 2007, the speeds ranged between 149 and 167 mph.[257] All of these speed ranges are below the 207 mph maximum modeled by Dr Hewitt. As shown by the modeling of these spray events conducted by Dr Hewitt, the combined effect of these altitudes and speeds does not result in any significant deposition beyond the clearings, even less in Ecuadorian territory.

(c) Ecuador's misleading depiction of flight speed and altitude of spray events

2.160. Ecuador not only assumes many parameters to have been violated at excessive levels in order to increase the predicted spray drift, but also provides rough and misleading illustrations to depict the alleged violations of the operational parameters. Those illustrations do not reflect reality.

2.161. Figure 2.4 in the *Reply*, which purports to show the speed of the spray events contained in the datasets, covers a

[257] CR, Vol. II, Annex 5: IMA Report (2011), Table 9, p. 13.

large stretch (some 109 miles, i.e., 176 kilometres) of the border between Ecuador and Colombia in the region of Sucumbíos and Putumayo, and it does so showing the entirety of the spray events in the eight year period from 2000 to 2008. Figure 2.6 in the *Reply* likewise shows the same stretch of border, this time showing the spray events colour coded by altitude.

2.162. The effect of depicting the spray events in this fashion is to create near solid blocks of colour. This is especially so given that the ground tracks of the individual spray lines are not depicted to scale, but rather use a thicker line. These figures show spray events over a period of some eight years, at a scale and resolution such that the depiction is meaningless.

2.163. Figures 2.13 and 2.14 in the *Reply*, which purport to show the alleged distance of the spray events adjacent to the border, follow the same approach, depicting the entirety of the spray events within 10km of the border over the entire eight year period. However, compounding the misleading character of the figures, Ecuador in addition depicts shaded bands which purport to show the distance from the nearest spray line.

2.164. The way in which Ecuador has represented this data is calculated to mislead. Rather than merely showing concentric circles showing the boundary of 1 km, 2 km, 3 km, 5 km, 7 km and 10 km from the nearest spray event in Colombian territory, Ecuador has chosen to colour these bands in shades of red of decreasing intensity. It is to be emphasised that these figures do not indicate deposition rates.

(d) Aircraft types

2.165. Ecuador alleges that Colombia's *Counter-Memorial* "misrepresents the type of aircraft Colombia uses in the spray program, falsely claiming to use the only aircraft that are designed for depositing chemical sprays with pinpoint accuracy."[258] Colombia never stated that it used only one type of aircraft in the course of the Program. In its *Counter-Memorial*, Colombia stated that "[t]he aircraft used for spraying operations are AT-802 planes manufactured by Air Tractor".[259] This is indeed the aircraft that was used at the time of Ecuador's Application in this case (and this aircraft continues to be used in the Program).[260] This does not mean that no other type of aircraft was previously used during the Program.

2.166. In fact, three types of aircraft have been used over the course of the Program and this fact has been publicly documented, including in documents submitted by Colombia as Annexes to its *Counter-Memorial*. The different types of aircraft used were mentioned in the Overview and Conclusions of the CICAD II set of studies;[261] the different types of aircraft were taken into account for the purpose of modeling drift in the CICAD II study;[262] and they are also mentioned in the study on

258 ER, para. 2.115.
259 CCM, para. 4.63
260 *Ibid.*
261 CCM, Vol. III, Annex 131-A, p. 914.
262 CCM, Vol. III, Annex 131-B, pp. 923, 925 and 928.

coca control and glyphosate formulations and adjuvants, which formed part of CICAD II.[263]

2.167. Additionally, the fact of use of the aircraft was mentioned in documents which Ecuador itself annexed to its *Memorial*, including the EMP approved by the Colombian Ministry of the Environment in 2001,[264] and the 2002 United States State Department "Report on Issues Related to Aerial Eradication of Illicit Coca in Colombia".[265]

2.168. In sum, Colombia has at no point sought to conceal the use of different types of aircraft, nor did it claim that the AT-802 was the *only* aircraft ever used.

2.169. What is dispositive for the present case is that, as noted, the 2009 CICAD II study relating to drift took into account the speeds of the three aircraft in order to model drift and deposition.[266] Furthermore, as shown above, drift modeling of spray events by Hewitt filed with this *Rejoinder* as Annex 2 includes modeling of the fastest speeds at which spraying took place in flights flown by the fastest of the three aircraft. As explained by Dr Hewitt, the speeds of the three aircraft would not result in the "dramatic impact" relating to droplet size alleged by Ecuador, as further explained in the relevant section below.[267] Ecuador's arguments with regard to the specific

---

263 CCM, Vol. III, Annex 131-C, p. 930.
264 EM, Vol. II, Annex 15.
265 EM, Vol. III, Annex 144.
266 CCM, Vol. III, Annex 131-B, p. 923.
267 See below paras. 2.202-2.209 and CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), p. 13.

features of each type of aircraft in order to attempt to portray them as unsuitable for the spraying operations, are therefore irrelevant.

(e) Pilot training and performance

2.170. Ecuador criticises the abilities and training of Dyncorp's pilots – Dyncorp being the State Department's contractor in charge of conducting the spraying – claiming that "[t]he pilots of the spray planes lack proper training and discipline, and routinely ignore operational requirements to prevent spray drift."[268] In an attempt to provide a foundation for its claims, Ecuador quotes isolated and fragmentary sentences, taken out-of-context, from selected documents, most of which pre-date the start of spraying operations in the border area with Ecuador, and which have no relevance at all for the present case.

2.171. In fact, quite apart from the environmental and other controls enforced by the Colombian authorities, all of the contractor personnel in charge of the pilots, certain key technical personnel and other logistical aspects of the spray operations, are subject to permanent supervision and control by the United States' State Department.

2.172. As Colombia stated in its *Counter-Memorial*[269] and sets out below, the pilots are thoroughly trained;[270] and, as evidenced

---

268 ER, paras. 2.123-2.133.

269 CCM, paras. 4.63, 7.17.

270 CR, Vol. IV, Annex 46: U.S. Emb. Certification with regard to pilots' training, from the NAS Director, James Story, to the Colombian Ministry of Foreign Affairs, 27 Sep. 2011.

by contemporary documents and evaluations, they are competent, experienced and disciplined professionals.

2.173. With regard to pilot training, the following certification from the United States' Embassy in Bogota describes the rigorous tests and continuous evaluations to which they are subjected:

> "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."[271]

2.174. Ecuador attempts to question the management and execution of the Program, by portraying the controls exerted by the State Department over its contractor, as evidence of alleged deficiencies.[272] In fact the relationship between the State Department and the contractor has been one of close oversight, as well as of permanent collaboration and coordination:

> "The United States State Department, Bureau for International Narcotics and Law Enforcement Affairs/Aviation Division (DoS/AD) provide a service that has an international impact on the reduction of illegal drugs… 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."[273]

2.175. In its *Reply*, Ecuador cites two passages taken from two different memoranda of 4 July and 14 November 1996, asserting that the State Department had highlighted that,

---

[271] CR, Vol. IV, Annex 46: U.S. Emb. Certification with regard to pilots' training, from the NAS Director, James Story, to the Colombian Ministry of Foreign Affairs, 27 Sep. 2011.

[272] ER, paras. 2.124-2.133.

[273] CR, Vol. IV, Annex 47: Interagency Committee for Aviation Policy, Aviation Resource Management Survey Team, Evaluative Arms Report of the United States State Department Bureau for International Narcotics and Law Aviation Division, Conducted August 24 through September 2, 1998, Document A2A, 3 Sep. 1998.

> "…. 'expansion of [aerial spraying] operations' during the 1990s 'brought with it associated problems in Colombian contract pilot capability', and expressed concern about their 'lack of experience'. The State Department cited as a particular problem the fact that 'management' had failed to 'adequately deal with the pilots (*sic*) lack of discipline"[274]

2.176. This fragmented quotation completely distorts the content of the two documents.

2.177. First of all, the Memorandum of 4 July 1996 refers to the specific observations pertaining to one month in a single year (June 1996), and *not* to "the 1990s" as Ecuador claims. What the Memorandum of 4 July 1996 actually states is the following:

> "The expansion of operations detailed in the Operations Planning paragraph, has brought with it associated problems in Colombian contract pilot capability.
>
> (…)
>
> Operation Planning: … 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."[275]

2.178. The Memorandum of July 1996, instead of pointing out deficiencies in the Program's execution, or referring to the

---

[274] ER, para. 2.124, quoting ER, Vol. III, Annexes 34 and 35.

[275] CR, Vol. IV, 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, pp. 1-2.

abilities of the pilots themselves, actually shows the efforts deployed to enhance and expand logistic and personnel capabilities, in order to pursue the fight against the scourge of the world drug problem. It is wholly unfounded to suggest that a temporary lack of sufficient personnel to cover the increased operations of the Program, noted in a report for the month of June 1996, supports the conclusion that all the pilots "…lack proper training and discipline, and routinely ignore operational requirements to prevent spray drift".

2.179. The Memorandum of 14 November 1996 concerns an isolated incident that occurred in relation to one of the pilots in October 1996 in connection with an emergency landing. Ecuador quotes a single sentence out of context, then takes several sentences from another document in support of its allegations of deficiencies in the Program's training for pilots and their lack of discipline.[276] Ecuador fails to mention that the document concerns a specific incident that endangered pilot safety, apparently for not following operating procedures. The report concerning this specific incident, also in 1996 and nowhere near the Ecuador-Colombia border, concerned flight safety and not spraying operations. The complete text reads as follows:

> "The pilots being trained are also demonstrating lapses of pilot discipline, professionalism, and ability to follow published guidance. Early in the month, three T-65 aircraft were shot because they were not following established operational procedures. These same pilots are scheduled for

[276] ER, para. 2.126, quoting ER, Vol. III, Annex 36.

> OV-10 training. This apparent lack of discipline is singularly the most dangerous safety of flight issue in the OV-10 program."[277]

2.180. Ecuador chose simply to delete the word "apparent" from the last sentence, linking it to another partial quote from Annex 38, a document from August 1997, in order to claim that the alleged "lack of discipline" mentioned in the 1996 document was demonstrated by the latter. The passage from Annex 38 refers to a specific situation with regard to spraying in the province of Caquetá, in August 1997, an area far distant from Putumayo and Nariño. The complete passage reads as follows:

> "Despite the fact the site experienced shortages in personnel during the month, the Contractor was able to satisfy mission requirements through creative scheduling. All aspects of readiness were performed in an outstanding manner, with the exception of the performance of *some* of the spray pilots. Recent verification of a series of complaints by local farmers *in the Caquetá Department of Colombia* provided clear examples that *some* spray pilots were using poor judgment. This, combined with unacceptable techniques resulted in collateral damage to legitimate crops and pastures. The overall damage to the image of the program this month by *these pilots* was significant."[278]

2.181. The event took place three years prior to the start of the spraying operations in the area close to the border with Ecuador. Moreover, in that same passage of Annex 38, the State Department acknowledged that the contractor had complied with all the mission requirements and that all aspects concerning

---

277 ER, Vol. III, Annex 36.

278 ER, Vol. III, Annex 38 (emphasis added).

mission readiness had been conducted in an "outstanding manner".

2.182. To conclude, these were isolated episodes, and do not reflect either on the quality of the Program or the competence of the pilots as a whole.[279] Moreover, they have no relevance for spraying operations which commenced in 2000 in the area close to the border with Ecuador.

2.183. Ecuador's *Reply* again provides an incomplete account of the facts in support of its claims with regard to the Program insofar as it quotes two sentences out of a 13-line paragraph from a Memorandum of 21 June 1999, in order to attempt to establish an alleged failing by the contractor. Ecuador asserts:

> "In 1999 the State Department was forced to conclude that the 'contractor' had 'failed to provide adequate OV-10 experience level' and that 'for almost six months the contractor has not provided adequate OV-10 standardization oversight of the OV-10 program.'"[280]

2.184. What the Memorandum of 13 June 1999 actually says is:

> "The contractor has continued to place emphasis on efficiency and cost accountability... This section is being *rated satisfactory* for two reasons: first, the contractor (PSD and Bogota) failed to provide adequate OV-10 experience level at the Larandia FOL, second, for almost six months the contractor has not provided adequate OV-10 standardization oversight of the OV-10 program, which may have

---

[279] CR, Vol. IV, Annex 50: Memorandum from INL/C/ASD-David Johnson to INL/RM/ASD-Grant Harden on Safety Award Fee Evaluation for October 1996, Document G 50, 14 Nov. 1996.

[280] ER, para. 2.128.

> contributed to the OV-10 incident."[281] (Emphasis added)

2.185. The State Department's assessment begins by recognising the contractor's emphasis on efficiency. The rating was "satisfactory", instead of "excellent" for two reasons that both referred to a technical and isolated incident with an OV-10 in May 1999, in the Larandia FOL (in the province of Caquetá). It was not, by any means, a generalised situation throughout the Program as Ecuador attempts to portray it.

2.186. It is also clear that the observations from the State Department relating to the specific OV-10 incident in Caquetá (again, not Nariño or Putumayo), were immediately attended to by the contractor, as a Memorandum of the same month (May 1999) states:

> "…in Colombia, an OV-10D had a gear-up controlled impact with the ground after take off. The cause of this 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."[282]

2.187. In any event, Ecuador also fails to explain how this incident involving an aircraft in Colombian territory far from the

---

[281] ER, Vol. III, Annex 39: Memorandum to Dyncorp PSD Manager from INL/RM/AD Stephen H. Harris, COR, Monthly Evaluation, May 1999.

[282] CR, Vol. IV, 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.

border area, in May 1999, i.e., prior to the start of the spraying operations in areas close to the border, relates in any way to the subject-matter of the present case.

2.188. In its *Reply*, Ecuador also misconstrues a survey reported on 23 March 2000 (Aviation Resource Management Survey of the Colombian Site), which it describes in the following terms:

> "Another inspection, this time in 2000, observed 'deficiencies' that, the State Department determined, 'requires immediate attention by management'. These problems included such basic issues as 'the overall organization and chain of command', which, the State Department concluded, had 'led to several complications and an overall confusion about duties and responsibilities'."[283]

2.189. The survey alluded to by Ecuador makes clear that the contractor was subject to continuing strict controls with regard to the Program's implementation in Colombia. The 2000 survey referred to above relates to an *in situ* visit from 12 to 18 March 2000, to the then-existing bases in Colombia (Larandia, San José, Tolemaida and Bogotá – and not Nariño or Putumayo where operations had not even begun at the time), by a team made up by experts in several areas (operations, maintenance, safety and management). Ecuador takes isolated sentences from this 37-page document (of which Ecuador only includes 7 pages in Volume III of its *Reply)*,[284] and extrapolates some observations made by the State Department out of context, in an attempt to call into question the execution of the Program.

---

[283] ER, para. 2.129.

[284] ER, Vol. III, Annex 40. Complete version found in Original Annexes CD.

2.190. However, in the Executive Summary of the same document, the importance and success of the operations conducted in Colombia, as well as the quality of all the personnel involved, are highlighted as follows:

> "General conclusions indicate a well-motivated interested workforce who believe and understand the mission of the Air Wing in Colombia. The quality of the personnel is outstanding and the success of the operations in Colombia can be attributed to them."[285]

2.191. Paragraph 2.131 of Ecuador's *Reply* begins by stating, without any evidence, that the contractor "apparently" did not implement the observations on safety made by the State Department 11 months earlier, in March 2000. Ecuador goes on to include a quote extracted from the document submitted as Annex 51 to its *Reply*, an evaluation from January 2001, claiming that the State Department complained about the "constant" need "to remind spray pilots of what to avoid, for example villages, etc."[286] In fact, Annex 51 does not contain any such sentence. In any event, it is difficult to see how the fact that pilots are encouraged and reminded to comply with all safety measures in the exercise of their functions can be regarded as in any way extraordinary or objectionable – still less relevant to the present case.

---

[285] ER, Vol. III, Annex 40, p. 1. Complete version found in Original Annexes CD.

[286] ER, Vol. III, Annex 51, no page mentioned, in Original Annexes CD.

2.192. Again, in the latter part of paragraph 2.131 of the *Reply*, Ecuador attempts to discredit the Program's implementation by quoting out of context single sentences from evaluations by the State Department of Dyncorp's performance. Thus, Ecuador quotes the document submitted as Annex 49 to its *Reply*,[287] stating that: "Several months later, the State Department was forced to criticise the spray program for the 'observed substandard condition of the aircraft', which it determined was a 'direct reflection of being understaffed'. The State Department insisted that 'IMMEDIATE attention in this area is recommended'".[288]

2.193. The actual paragraph that Ecuador quotes reads as follows:

> "NOTE: For a second month in a row, a shortage of maintenance technicians has been reported in the UH-1N Eradication program. The NMCM rate and the observed substandard condition of the aircraft are a direct reflection of being understaffed as described in the monthly report. IMMEDIATE attention in this area is recommended".[289]

2.194. That quotation makes perfectly clear that the problem to which the State Department was referring was a lack of maintenance technicians for the aircraft. Again, Ecuador fails to establish how any of these matters, whether lack of technical personnel or technical issues with the aircraft are related to the likelihood of damage occurring on its territory.

---

287 ER, Vol. III, Annex 49, p. 4, in Original Annexes CD.
288 ER, para. 2.131.
289 ER, Vol. III, Annex 49, p. 4, in Original Annexes CD.

2.195. Ecuador refers to certain observations made to the contractor by the State Department in March 2002, but again takes them out of context. The first part of paragraph 2.132 of the Ecuadorian *Reply* reads as follows: "In March 2002, the State Department criticized the 'systemic failure in following of aircraft operational procedures' and complained about the 'lack of importance placed on the safety program.'"[290]

2.196. However, the complete text reads as follows:

> "The contractor failed to notify the Advisor Staff of two major engine problems in the T-65 program, the staff was notified two days after the event when the PNC was looking for replacement engines. These engine problems were a major cost impact on the program; they affected T-65 eradication operations and reflect a systemic failure in following *aircraft* operational procedures. There was no safety' investigation performed nor a CIR completed on the T-65 engine problems that were found this month, this reflects a lack of importance placed on the safety program of the T-65 operation by the contractor."[291]

2.197. From this evaluation, referring solely to the month of March 2002, it is evident that the State Department was alluding to a specific incident relating to problems with the engines of the T-65 aircraft, and the fact that the matter had not been investigated sufficiently speedily. Ecuador fails to explain how a failure in the timely reporting of two damaged engines could have affected it or how it relates to the subject-matter of the present case.

---

290 ER, Vol. III, Annex 44, p. 5, in Original Annexes CD.

291 *Ibid.* (Emphasis added)

2.198. It should be pointed out that these memoranda, and indeed the hundreds of other similar documents that refer to the Program's control and monitoring, reveal that its implementation was rated excellent or satisfactory; only a few contain admonitions or recommendations for adjustments or improvements, and these were implemented accordingly, as noted in subsequent reports.[292] Ecuador has taken the few exceptions to the rule in an attempt to build a fictitious argument.

2.199. In any event, Ecuador has failed to establish the relevance of the selective evidence submitted with the *Reply* to the subject-matter of its *Application*. On what basis do inventory levels, rationalisation and reorganisation of the mission in Colombia have any bearing upon alleged damage suffered within Ecuadorian territory or supposed adverse effects allegedly suffered by its nationals? The answer is: none whatsoever.

2.200. In order to make the sweeping and unfounded assertion that "… pilots are undisciplined, lack sufficient training and ignore operational requirements, especially in regard to preventing spray drift",[293] Ecuador has had to resort to taking isolated sentences, taken out of context, scattered across different months and years from a large body of rigorous monthly reports and evaluations from the State Department in

---

[292] CR, Vol. IV, Annex 52: United States Department of State, Sample Contractor Evaluations, Documents G 93, L 16, L 26, L 34 and L 41

[293] ER, para. 2.133.

relation to the operations of Dyncorp. Those reports and evaluations were generally highly positive and complimentary. As such Ecuador presents only a distorted account of the true situation. Further, not only does Ecuador fail to substantiate any of its unwarranted conclusions on the basis of the State Department's observations as to Dyncorp's operations and the Program, but there is no causal link between these minor isolated criticisms of the operations and the supposedly adverse effects allegedly caused to Ecuador by spray drift.

2.201. In conclusion, the evidence relied upon by Ecuador in support of its allegations with regard to pilot performance and management of the Program is fragmented, taken out of context and distorted. It pre-dates and does not even refer to spraying operations in the border area. The conclusions it seeks to draw are falsified by contemporaneous documents from the same sources, sources which Ecuador has in its possession and chose not to submit or analyse.

(3) DROPLET SIZE

2.202. According to Ecuador, Colombia agrees that, in addition to aircraft speed and height of the spray release, droplet size "significantly contribute[s] to drift".[294] What Colombia stated was that drift is contingent on, among other factors, "the initial size of the spray droplets."[295]

---

294 ER, para. 2.134.

295 CCM, para. 4.68.

2.203. While Ecuador bases itself on bibliographical references and computer modeling in support of its arguments with regard to droplet size, Colombia based its conclusions on actual results with regard to measurements obtained from a wind tunnel atomization study on the tank mixture used for aerial spraying which was performed for the CICAD II study. The modeling is described as follows: "The droplet size spectra were measured in a wind tunnel for an AccuFlo nozzle (with 16 size 0.085 [2.16 mm] orifices), under appropriate aircraft speeds (up to 333 km/h), using a laser diffraction instrument covering a dynamic size range for droplets of 0.5 to 3,500 μm."[296]

2.204. To measure droplet size, the modeling used aircraft speeds of up to 333 km/h (207 mph). The results showed that the median droplet size was equal to or greater than 128 μm. In this regard, Dr Hewitt observes that:

> "Interestingly, this is within the range of droplet sizes typically used for targeting sprays to foliage in applications around the world for tree, vine and other leafed crops. While the optimum size for a given application varies according to factors such as canopy type, product efficacy and sprayer setup, most applications of pesticides to tree canopy foliage involve droplets with average diameter somewhere between 50 and 150 μm because collection efficiency of the foliage is highest for these droplet sizes."[297]

2.205. Of the 3,917 spray events for which speed data was recorded in the relevant area, 3,561 recorded speeds under 333

---

[296] CCM, Vol. III, Annex 131-B, p. 325.

[297] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 11, pp. 5-6.

km/h (207 mph). This means that in *all* of these spray events, i.e., 90.9% of the total, median droplet size would have been larger than 128 μm. Indeed, 3,317 (84.7%) of the spray events were slower than 296 km/h (184 mph), resulting in droplet size larger than 173 μm. Furthermore, 1,627 (41.5%) were slower than 259 km/h (160 mph), the lowest speed modeled by Dr Hewitt for CICAD II. For these, droplet size would be larger than 219 μm. Thus, a very high percentage of the droplet sizes of the spray events in the relevant area are substantially larger than 150 μm, at the high end of the range of average diameter commonly involved in applications of pesticides to tree canopy foliage. In any case, the remaining 9.1% of spray events were also modeled by Dr Hewitt and the resulting deposition rates were insignificant.[298]

2.206. Ecuador states that "a full 50 per cent of the droplets are even smaller than the 128-140 μm median size."[299] This is not true. First of all, Dr Hewitt in his CICAD II report did not state that 128-140 μm was the median size; he only compared median droplet sizes resulting from modeling of the tank mixture (128 μm) and *glyphosate alone* (140 μm) at the highest speed 333 km/h (207 mph). What he did conclude was that at an aircraft speed of 333 km/h (207 mph), the droplet size of the tank mixture was 128 μm; at 259 km/h (160 mph) the droplet size of the tank mixture was 219 μm.

---

298 See above paras. 2.134-2.139.

299 ER, para. 2.136.

2.207. Secondly, and most importantly, Ecuador's assertion is disproved by the facts: the average aircraft speed of the analysed events was 240.1 km/h (149 mph) and thus, the average droplet size was larger than 219 μm. As explained further by Dr Hewitt in 2011,

> "It should be noted that 128 μm is the lowest droplet size in the range, but should not be taken as the rule, since the average speeds of two of the aircraft that have been used in the Program result in larger droplets."[300]

2.208. Moreover, the incidence of droplet size in drift and deposition is further diminished due to the interaction with relative humidity in the conditions prevailing in the area. As stated by Dr Hewitt in his CICAD II report:

> "Because the relative humidity (RH) of the air exerts an influence on spray drift, particularly for smaller droplets, additional modeling was conducted to characterize spray drift at an RH of 90%, which is more typical of the conditions that occur in the Nariño and Putumayo areas in the SW part of Colombia. The modeling data (Figure 6) demonstrate that the majority of the active ingredient (>90%) deposits within 100 m of the swath edge. *Under higher humidity conditions, comparatively lower deposition of active ingredient occurs at downwind distance,* with the differential being most pronounced at distances beyond 200 m downwind. This pattern reflects the disproportional influence of relative humidity on smaller droplets (<150 μm), which are primarily responsible for drift, but which also carry a small proportion of the total amount of active ingredient released into the

[300] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 30, p. 13.

> air. The effect of evaporation is due to the loss of water, which is important because even the most concentrated tank mixture included approximately 50% by volume of water. This means that at least half of the droplet volume could potentially be lost through evaporation."[301]

2.209. Lastly, as explained by Dr Hewitt, the operative principle is that even when there is a greater dispersion in the atmosphere, with greater dilution there is lower deposition – i.e., below the levels of concern for sensitive areas – at far-field distances.[302]

(4) APPLICATION RATE

2.210. At the outset, it should be noted that Dr Giles' conclusions with regard to application rates in Colombia's PECIG are based on erroneous assumptions. As explained by Dr Hewitt:

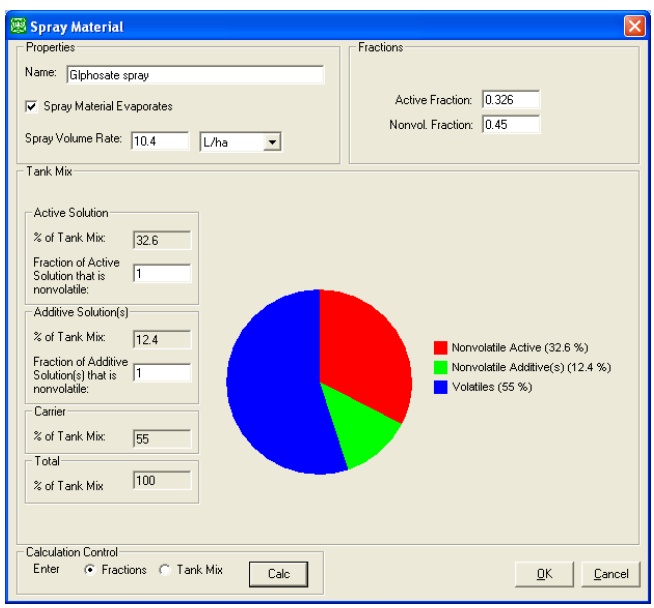
> "Giles suggests that the use rate of sprays applied in PECIG is higher than assessed in the Hewitt et al (2009) paper. On page 25 of his report, a table is presented showing application rates of 10.4 L/ha as assumed by Hewitt et al (2009) compared to various higher rates between 20 and 28 L/ha. Application rates for sprays applied by aircraft can be described by the total application volume rate (which includes everything in the tank mixture – i.e. the carrier, which is usually water, plus the formulated pesticide product plus any adjuvants) and by the active ingredient application rate. The formulated pesticide product usually includes both the active ingredient (glyphosate in this case) and various inert materials used to optimize delivery/ mixing. Different rates

---

301 CCM, Vol. III, Annex 131-B, pp. 925-926 (emphasis added).

302 CR, Vol. II Annex 1: Hewitt Report – Response to Giles (2011), para. 23, p. 10. Cf. *Ibid*, para. 31, p. 13.

are used for coca than for poppy spraying in PECIG. The applications for coca spraying were typically based on application rates of 10.4 L/ha formulated glyphosate/ 23.64 L/ha total spray mixture (~680 L/min total flow rate for a swath width of ~52 m and the actual aircraft speed of ~93 m/s for the OV-10) of total tank mixture with the glyphosate herbicide product included at a rate of 1.2 to 4.992 kg/ha, of which 75% was the actual acid equivalent product, glyphosate (the remaining 25% was inert materials included for product formulation optimisation). AGDISP has different model input sections which need to be populated to enter all of this information because the model requires information on the rates of the various tank mixture components as well as the rate applied per hectare of sprayed ground. The following figure shows an example of the model section for input of this information.



In this example, the spray volume rate is 10.4 L/ha of which approximately one third is active ingredient glyphosate. Because the key factor is the active ingredient rate, if the spray volume rate is

> changed for the same active ingredient rate, there will be little or no difference in drift from applications such as those in PECIG. Hence the Hewitt et al (2009) paper is not in error in its calculations of spray drift levels for using a spray volume rate of 10.4 L/ha rather than 23.65 L/ha or any other value cited from PECIG sources, because the active ingredient rate range was correct for the operational uses."[303]

2.211. Notwithstanding this necessary clarification, Dr Giles acknowledges that "the actual values, are in the range of 23.65 l/ha [6.25 gal/ha] based on the flight path data."[304] Indeed, that data shows that for the 2,435 spray events in the relevant area that recorded a value for application rate (excluding 2000, 2001 and 2004, as Ecuador did), the average was in fact 22.67 l/ha (5.98 gal/ha).[305]

2.212. Out of all the spray events in the relevant area for which application rates were recorded, 1,522 were at or below 23.65 l/ha. Of the 913 spray events that recorded application rates exceeding the 23.65 l/ha figure, 552 (60.5%) did so by a margin of only 5%, i.e., up to 24.83 l/ha. Not a single event exceeded it by more than 20%.[306] It should be recalled that, in any case, the presence of trees or foliage surrounding and downwind of the spray application swath acts as an effective barrier to filter out drift of spray.[307]

---

303 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 18, p. 8.
304 ER, Vol. II, Annex 2, p. 24.
305 CR, Vol. II, Annex 5: IMA Report (2011), para. 6.7, p. 16.
306 *Ibid.*, Table 11, p. 15.
307 See above paras. 2.122-2.127.

2.213. Colombia requested Dr Hewitt to run the AGDISP model used by both Hewitt and Giles, in order to analyse drift and deposition of the spray events with the highest values for application rate in the years 2002, 2003, 2005, 2006 and 2007. When there was more than one event with the same value for application rate, the one closest to the border or the river bank on the Ecuadorian side of the border was analysed. When there was an event with an application rate that was not the absolute highest, but which was closer to the border, it was this event that was analysed.

2.214. In 2002, the highest application rate recorded was of 3 gal/acre (i.e., 28.05 l/ha), for 3 spray events.[308] The one closest to the border of those 3 events, was at a distance of 704 metres from the river bank on the Ecuadorian side of the border. The closest spray event with an application rate higher than 23.65 l/ha (with a value of 2.6 gal/acre, i.e. 24.31 l/ha) was at a distance of 52 metres from the river bank on the Ecuadorian side of the border.[309] As Dr Hewitt states, the levels of deposit downwind "rapidly approach zero within a few hundred meters."[310] As such, there would have been only minimal deposition, and drift could not have resulted in any of the damages complained of by Ecuador. Dr Hewitt confirmed this

[308] CR, Vol. II, Annex 5: IMA Report (2011), Table 13, p. 17.
[309] *Ibid.*, Table 14, p. 18.
[310] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

conclusion after modeling these events and estimated deposition values of 0.31 g/ha and 0.23 g/ha, respectively.[311]

2.215. In 2003, the highest application rate recorded was of 2.8 gal/acre (i.e., 26.12 l/ha), in 4 spray events.[312] The one closest to the border of these 4 events was at a distance of 71 metres from the Ecuadorian side of the river. The closest spray event with an application rate higher than 23.65 l/ha (with a value of 2.6 gal/acre, i.e. 24.31 l/ha) was at a distance of 12 metres from the border.[313] Dr Hewitt modeled these events and estimated deposition values of 0.58 g/ha and 0.57 g/ha, respectively.[314] Even in these circumstances, there was no significant deposition of the spray mixture as a result of drift in Ecuadorian territory.

2.216. In 2005, the highest application rate recorded was of 7.5 gal/ha (i.e., 28.39 l/ha).[315] The distance to the river bank on the Ecuadorian side of the border was 710 metres. The closest spray event with an application rate higher than 23.65 l/ha (with a value of 6.7 gal/ha, i.e. 25.36 l/ha) was at a distance of 277 metres from the river bank on the Ecuadorian side of the border.[316] On this basis there could have been no significant deposition, and drift could not have resulted in any of the damages complained of by Ecuador. Dr Hewitt confirmed this

311 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 35 and 40.
312 CR, Vol. II, Annex 5: IMA Report (2011), Table 13, p. 17.
313 *Ibid.*, Table 14, p. 18.
314 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 24 and 25.
315 CR, Vol. II, Annex 5: IMA Report (2011), Table 13, p. 17.
316 *Ibid.*, Table 14, p. 18.

conclusion after modeling these events and estimated deposition values of 0.36 g/ha and 1.22 g/ha, respectively.[317]

2.217. In 2006, the highest application rate recorded was of 7 gal/ha (i.e., 26.5 l/ha), at a distance of 884 metres from the river bank on the Ecuadorian side of the border. However, the closest spray event to the border recorded an application rate of 6.9 gal/ha (i.e., 26.12 l/ha), at a distance of 430 metres from the river bank on the Ecuadorian side of the border,[318] and therefore this one was chosen for analysis. Dr Hewitt modeled this event and estimated an insignificant deposition amount of 0.31 g/ha.[319]

2.218. In 2007, the highest application rate recorded was of 7.1 gal/ha (i.e., 26.87 l/ha), at a distance of 943 metres from the border. However, there was a spray event with a recorded application rate of 7 gal/ha (i.e., 26.5 l/ha) that was closer to the border, at a distance of 552 metres from the Ecuadorian side of the river[320] and this was chosen for analysis. The closest spray event with an application rate higher than 23.65 l/ha (with a value of 6.5 gal/ha, i.e. 24,60 l/ha) was at a distance of 407 metres from the border.[321] Dr Hewitt modeled these events and estimated deposition values of 0.06 g/ha and 0.05 g/ha,

---

317 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 32 and 8.

318 CR, Vol. II, Annex 5: IMA Report (2011), p. Table 14, p. 18.

319 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 34.

320 CR, Vol. II, Annex 5: IMA Report (2011), p. Table 14, p. 18.

321 *Ibid.*

respectively,[322] which could not have resulted in any of the damages complained of by Ecuador.

2.219. In conclusion, *all* of these values, ranging between 0.05 g/ha and 1.22 g/ha, are well below the levels of concern for sensitive animal and plant species. As noted above, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[323] This shows that no damage could have been caused in Ecuador.

(5) TEMPERATURE, HUMIDITY AND WIND CONDITIONS

2.220. Ecuador's assertion with regard to the combined effect of higher temperature and lower relative humidity oversimplifies a complex interaction and misrepresents the actual conditions present in the Putumayo and Nariño provinces.[324] This leads to incorrect assumptions and conclusions with regard to the risk of spray drift.

2.221. In this area, relative humidity is not "low", but is typically between 70% and 90%. As regards temperature, the usual mid-day ranges are between 22.5°C and 30.3°C.[325] Precisely due to these characteristics and the complex relation between relative humidity and temperature, Dr Hewitt ran the

---

[322] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 58 and 61.

[323] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; CCM, Vol. III, Annex 131-B, p. 927.

[324] ER, para. 2.151.

[325] CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011, Vol. II pp. 697-702.

AGDISP model with 70% and 90% inputs for relative humidity, in both cases with an input for air temperature of 35°C, as follows:

> "Because the relative humidity (RH) of the air exerts an influence on spray drift, particularly for smaller droplets, additional modeling was conducted to characterize spray drift at a RH of 90%, which is more typical of the conditions that occur in the Nariño and Putumayo areas in the SW part of Colombia. The modeling data (Figure 6), demonstrate that the majority of the active ingredient (>90%) deposits within 100 m of the swath edge. Under higher humidity conditions, comparatively lower deposition of active ingredient occurs at downwind distance, with the differential being most pronounced at distances beyond 200 m downwind. This pattern reflects the disproportional influence of relative humidity on smaller droplets (<150 μm), which are primarily responsible for drift, but which also carry a small proportion of the total amount of active ingredient released into the air. The effect of evaporation is due to the loss of water, which is important because even the most concentrated tank mixture included approximately 50% by volume of water. This means that at least half of the droplet volume could potentially be lost through evaporation."[326]

2.222. Ecuador suggests that the last sentence of the quote above, regarding droplet volume loss through evaporation, supports its argument with regard to increased drift risk.[327] However, as noted in the quoted paragraph, the smaller droplets that could be subject to drift also carry a small amount of the active ingredient. As Dr Hewitt explains:

---

326 CCM, Vol. III, Annex 131-B, pp. 328-329.

327 ER, Vol. II, Annex 2, p. 7.

> "If a droplet does experience complete loss of all its volatile components by evaporation prior to deposition, its final size will depend on the proportion of the contents which were non-volatile and typically such small droplets would be dispersed and diluted in the atmosphere to tiny (de minimum) amounts."[328]

2.223. Thus, in the conditions typical of the relevant area, the interaction between relative humidity and temperature does not result in increased drift risk. Over 90% of the spray deposits within 100 m of the swath edge and, as Dr Hewitt states, the levels of deposit downwind "rapidly approach zero within a few hundred meters."[329] Even the smaller droplets that could be subject to drift would carry an insignificant amount of the active ingredient.

2.224. As for wind, Ecuador suggests, on the basis of the Giles Report, that "strong winds may carry spray droplets – particularly the small droplets dispersed by Colombia's spray planes – great distances, leading to deposition at 10 kilometres or more from the application site."[330] However, as stated by Dr Hewitt, at long-range distances the relationship between wind speed and deposition of drifting particles is not the same. Higher wind speeds often produce greater dispersion in the

---

328 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 16, p. 7.
329 *Ibid.*, para. 32, p. 14.
330 ER, para. 2.152.

atmosphere, and with greater dilution there would be lower deposition at far-field distances.[331]

2.225. Seemingly, the god Aeolus can do no right by Ecuador. Indeed, according to Ecuador, although high winds are considered risky, low winds are no better, since they state that,

> "times of no wind (essentially below 3 km/hr) often precede or accompany periods of high stable air and surface temperature inversion conditions both of which can greatly increase spray drift risk. Moreover, when wind resumes after periods of calm, its direction is not predictable."[332]

2.226. However, as Dr Hewitt clarifies,

> "[t]he 3 km/h wind speed rule of thumb is not a universal one because while an inversion will always be accompanied by little or no wind, the opposite is not always true. Under some circumstances such as heavy cloud cover at night, inversions may not exist even though the wind speed is very low."[333]

2.227. Moreover, with low wind speeds dispersion for any substance would be minimal, much less when the substance is liquid, in droplet form. When wind speeds are low, gravity acts on the drop, pulling it towards the ground such that it is deposited very close to the emission point.[334]

---

[331] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 23, p. 10. See also *Ibid.*, para. 31, p. 13.

[332] ER, para. 2.152.

[333] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 21, p. 9.

[334] K. Wark, *et. al., Air pollution: its origin and control*, Harper and Row Publishers, New York, NY, 1981, Chap. 4.

2.228. In the southern parts of Nariño and Putumayo provinces mild winds are prevalent (64% of daily records for 100 months between 2000 and 2008) and the mean wind speeds are in the order of between 1 m/sec and 2 m/sec, i.e., 3.6-7.2 km/h, low values. Further, meteorological analyses show that for most of the year, predominant winds in the border area blow from Ecuador towards Colombia and their speeds are low.[335] This can be clearly seen in the multiannual average for Mean Wind Speed, in Colombia's Atlas of Winds and Eolic Energy:[336]

[335] CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011, Vol. II pp. 702, 706-730.

[336] Available at: https://documentacion.ideam.gov.co/openbiblio/Bvirtual/019813/Capitulo1.pdf, p. 33.

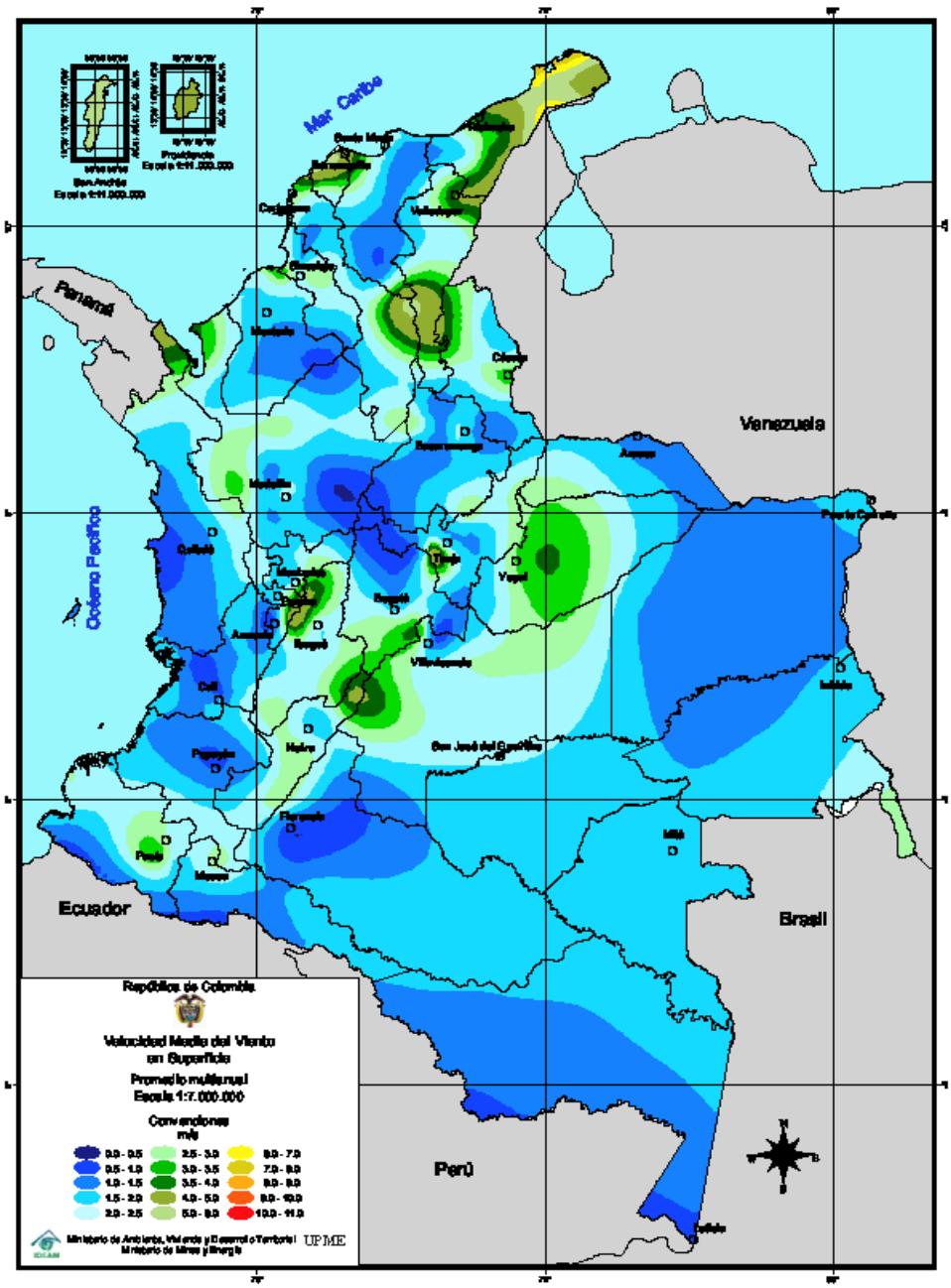


Figure 2-8 Mean wind speed

2.229. For purposes of drift and deposit calculations, in CICAD II, Dr Hewitt ran the AGDISP model with a wind speed input of 2.7 m/sec (9.3 km/h); the results showed that over 90% of the spray deposited within 100 m of the swath edge.[337] Thus, downwind the amount of spray mixture deposited began decreasing exponentially as close as 200 metres and fell below the level of concern for sensitive species. According to Dr Hewitt, as a result of the modeling in 2011, the levels of deposit downwind "rapidly approach zero within a few hundred meters."[338]

2.230. Ecuador relies upon its expert's findings with regard to the purported long-distance deposit of the spray mixture – conveniently ignoring the shortcomings in the inputs used in the modeling as explained by Dr Hewitt when analysing the Giles Report, including assuming that wind in the area will always blow south towards Ecuador.[339] That is not the case.

2.231. Colombia's Atlas of Winds and Eolic Energy (*Atlas de Viento y Energía Eólica de Colombia*) contains maps showing the multiannual figures for wind speed and trends for wind direction for each month of the year.[340] These show that the general trend of the winds in the relevant area near the border is

---

337 CCM, Vol. III, Annex 131-B, p. 925.

338 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

339 *Ibid.,* para. 2, p. 5.

340 For speed, available at: https://documentacion.ideam.gov.co/openbiblio/Bvirtual/019813/Capitulo1.pdf, pp. 21-33, 156-158; for wind direction, available at: https://documentacion.ideam.gov.co/openbiblio/Bvirtual/019813/Anexo4.pdf

from Ecuador towards Colombia, as illustrated in the following figure:

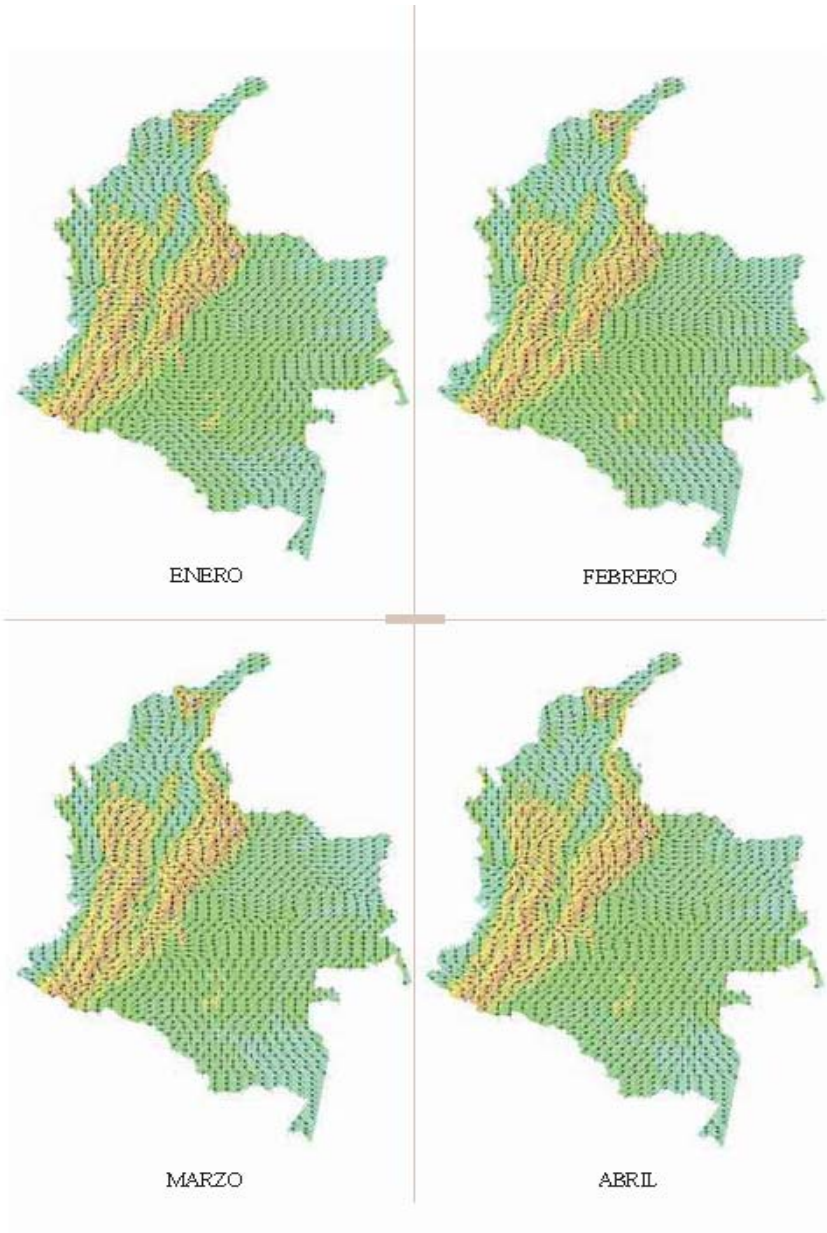


Figure 2-9 Wind current lines in January-April

2.232. Detailed monthly wind trend maps for Nariño and Putumayo, on the basis of the Atlas' data are included in the Report by IDEAM,[341] and a sample is provided below (Figure 2-10).

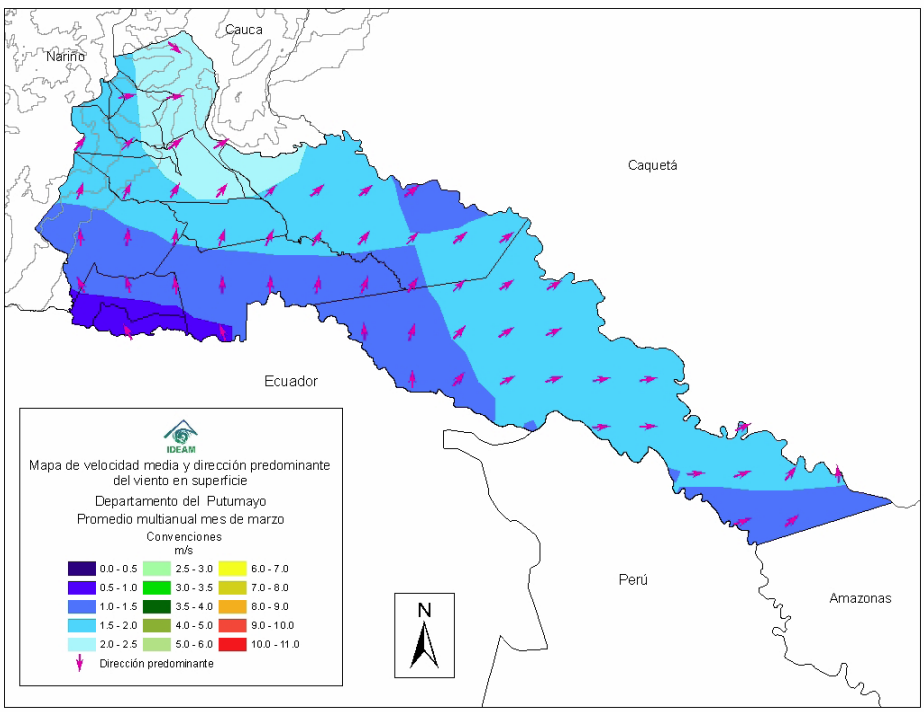


Figure 2-10 Mean wind speed and predominant wind direction in March in Putumayo Department.

2.233. Ecuador's failure to produce any evidence in support of the actual wind conditions in the area – for the purpose of providing a foundation for the assumptions it makes with regard

341 CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011, Vol. II pp. 706-730.

to wind direction as well as the theories it spins in relation to wind speed – is belied by these trends.

2.234. Ecuador criticises Colombia's verification of weather conditions. In fact, as stated in the *Counter-Memorial*, weather conditions including temperature, relative humidity, wind direction and wind speed are carefully verified prior to and during every spray operation.[342]

2.235. Prior to the start of each spray mission, a reconnaissance aircraft flies over the areas targeted for eradication and its pilot verifies if weather conditions are appropriate to authorize the beginning of the operations.

2.236. During the reconnaissance flight, the pilot determines if wind conditions are appropriate. He releases a discharge of smoke – known as Beeper – (Figure 2-11) and how it behaves once it is in contact with the wind is observed. If the smoke moves only slightly, indicative of mild winds, spray operations are authorized; otherwise, they are cancelled.

342 CCM, para. 4.61; CCM, Vol. II, Annex 67.

Figure 2-11 Photograph taken in Tumaco (Nariño Province), showing validation of wind conditions present at Plot targeted for eradication, by means of smoke discharge (Beeper).

2.237. This procedure (emission of "beeper") is repeated by the pilots during the spray missions in order to confirm that wind conditions remain appropriate (Figure 2-12). Risk of drift is thus reduced to a minimum.

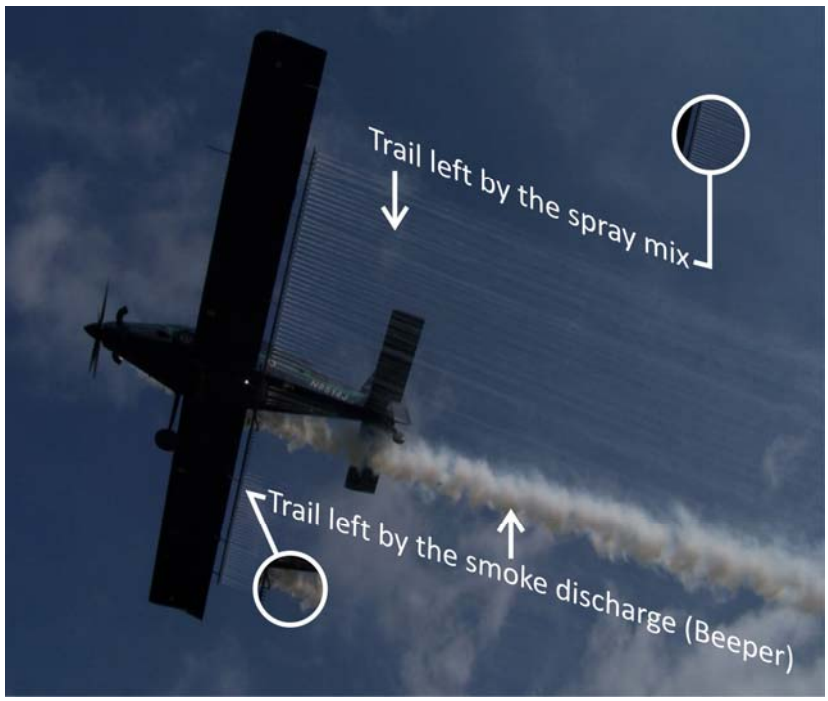


Figure 2-12 As seen from below the aircraft, the difference between trail left by the spray mixture and that of the smoke discharge (Beeper) is clearly visible.

2.238. The general trend of the weather conditions present in the relevant area is compatible with the requirements of the EMP. Likewise, they are verified and, in cases when they do not meet the requirements, operations are cancelled. These cancellations are noted in No-Spray Records, examples of which are included in the DIRAN Report.[343]

2.239. Modeling by Dr Hewitt in both 2009 and in 2011, with inputs reflecting the actual weather conditions (worst-case, in fact, with regard to wind speed and direction) of the area, shows

[343] CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, Section III, Spraying Mission Cancellation Due to Weather, pp. 45-58.

that over 90% of the spray mixture deposits within 100 m of the swath edge and thereafter, the remaining deposition downwind of the swath edge begins to decrease exponentially and rapidly falls below the level of concern for the most sensitive species, falling effectively to zero within 300 metres.[344]

(6) ALLEGED NIGHT-TIME SPRAYING

2.240. Ecuador asserts that "the data collected by the spray planes confirm Colombia's night time spraying on a massive scale."[345]

2.241. This is not true. No aerial spraying operations for the eradication of illicit crops in areas adjacent to the border with Ecuador have been conducted during night time.[346] It is true that at one point, the relevant agencies contemplated the possibility of conducting night sprayings – the operational parameters of the 2001 EMP allowed it – and a few experimental test runs were conducted. But the option was discarded due to the risk such operations entailed for the safety of pilots and aircraft. At no time were these tests ever conducted in areas adjacent to the border with Ecuador.

2.242. This is evidenced by the certification from the United States' Embassy in Bogotá on the matter:

> "The Government of the United States with the cooperation of the Colombian National Police

---

344 CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14; CCM, Vol. III, Annex 131-B, pp. 925-926.
345 ER, para. 2.147.
346 CCM, para. 7.27.

> 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 neighbouring country, Ecuador."[347]

2.243. With regard to Ecuador's analysis and reading of the spray data furnished by the State Department, the Colombian authority in charge of the technical management of the spray database, i.e., the Anti-Narcotics Police (DIRAN) performed a thorough review of the data in order to determine the reason why apparent night time sprayings were recorded when they in fact took place during the day.[348]

2.244. As a result of that analysis, it was determined that in relation to the records which appear to show night time spraying, part of the data provided to Ecuador by the US State Department does not reflect the actual spraying time, but is rather the result of a discrepancy caused when the pilots manually set the offset of the system's clocks.

---

[347] CR, Vol. IV, Annex 51: United States Embassy Certification with regard to night spraying tests and erroneous time data from DelNorte, from the NAS Director, James B. Story, to the Colombian Ministry of Foreign Affairs, 27 Sep. 2011.

[348] CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, Section I, Analysis of Time Records, pp. 2-38.

2.245. The time of spraying is recorded by the SATLOC and DelNorte software systems.[349] Given that the default software time is GMT + 0:00 (Greenwich Mean Time) and local time in Colombia is GMT minus 5 hours (-5:00), pilots would have to key in "-5" (minus five) on the software's offset in order for it to record the local time at which the spraying actually took place.

2.246. However, it appeared that some pilots keyed in "5" (i.e. +5) as the offset, which the software records as GMT +5:00, causing a 10-hour time-lag with regard to the real local time of spraying. Further, it appears that other pilots did not make any such adjustment, and therefore the software remained at GMT +0:00, causing a time-lag of 5 hours with regard to local time. In this regard, it is relevant to recall that adjusting the time offset is not one of the tasks listed in the pre-flight check lists that pilots are required to follow.[350]

2.247. These differences of plus 10 or 5 hours, between the time recorded on the system and local time in Colombia, are evidenced on the spraying records. For instance, in the case of a 10-hour time-lag, spray events conducted at 13:00 local time were recorded by the software as if they had been conducted at 23:00; if the time-lag was 5 hours, spray events were recorded as conducted at 18:00. That is the reason why the software recorded numerous spray events which appeared to indicate that

---

349 CCM, Vol. II, Annex 67.

350 CR, Vol. IV, Annex 51: U.S. Emb. Certification with regard to night spraying tests and erroneous time data from DelNorte, from the NAS Director, James Story, to the Colombian Ministry of Foreign Affairs, 27 Sep. 2011.

they had taken place at night. In fact they were conducted in broad daylight.

2.248. It should be noted that there are procedures that allow for corroboration of the times at which each spraying mission was carried out. On a hand-written form, normally referred to as the Pilot's Spray Data Sheet, pilots are required to fill out the local start time of the spraying mission (takeoff). When returning to base, the pilots deliver the Pilot's Spray Data Sheet duly filled out to the Mission Planner, along with the data card that contains the data with the records of the spray events.[351]

2.249. The Mission Planner transcribes all the data relevant to the mission onto an Excel spreadsheet called Daily Flight Summary –DFS –, based on the information contained on the data card used in the system, with the exception of the start (takeoff, TO) time and duration of the mission. This is due to the fact that the software only records the start and duration of each multiple spray event[352] which normally take place within a single spraying mission. The start (takeoff, TO) time and duration of the spraying mission itself, as a whole, are taken from the Pilot's Spray Data Sheet.

2.250. All of this is confirmed by the certification from the United States' Embassy in Bogotá:

---

[351] See CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, Section I, Analysis of Time Records, pp. 2-3.

[352] Spray event is understood as each instance in which the pilot presses and releases the button (trigger) for releasing the spray mixture.

> "There are spray data submitted to Ecuador from DelNorte system which may indicate night spraying operations after those dates. The information contained in DelNorte 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 DelNorte 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." [353]

2.251. In sum, whenever pilots correctly adjusted local time (GMT -5:00), the records in the software will be within the range of the time recorded on the DFS. Otherwise, a time-lag of plus 5 or 10 hours between the DFS and the spray data recorded on the data card will appear. To determine the actual time of spraying it is necessary to refer to the time of the start of the mission recorded on the DFS.

2.252. In order to show this time-lag in spray records for the time of spraying, spray missions from every year, in which

---

[353] CR, Vol. IV, Annex 51: U.S. Emb. Certification with regard to night spraying tests and erroneous time data from Del Norte, from the NAS Director, James Story, to the Colombian Ministry of Foreign Affairs, 27 Sep. 2011.

several aircraft were operating in the same area within the same timeframe (in the daytime obviously), were analysed. The spray records from the software sometimes showed different times for the different aircraft involved in the same mission, i.e., some reflected a 5 or 10 hour difference compared to the local time recorded in the Daily Flight Summary (DFS) for the mission, resulting in records showing times between 18:00 and 06:00 hours, as if the spray operations had been conducted during night time.

2.253. DIRAN presents several cases from 2003 until 2007, in which this time-lag is clearly evidenced.[354] One of these cases is set out below, in order to illustrate that the purported night time sprayings actually took place in the daytime:

> "[A mission was] carried out on 1 January 2007 on coca crops, in which 5 aircraft identified with codes K, L, O, P and F took part. Rows 1, 2, 3 and 5 show the time-lag in the start time, as follows:

MISSION CODE	ACTUAL TIME DFS RECORDS	DELNORTE SOFTWARE RECORDED TIME	TIME-LAG	DURATION OF THE SPRAY MISSION
A017**K**QAC	12:04	22:25	10:21	01:24
A017**L**AAC	12:04	23:25	11:21	01:24
A017**O**PAC	12:04	17:25	05:21	01:06
A017**P**-AC	12:04	12:25	00:21	01:06
A017**F**EAC	12:04	22:25	10:21	01:24

> Row 1 corresponds to the aircraft with tail number PNC 4002, code K. It may be seen that the time recorded by DelNorte software was 22:25, while

[354] CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, Section I, Analysis of Time Records, pp. 5-38.

that on the DFS was 12:04, evidencing a time-lag of plus 10 hours, and the 21 minutes of the aircraft's flight to spray area and preparation for spraying.

Row 2 corresponds to the aircraft with tail number PNC 4003, code L. It may be seen that the time recorded by DelNorte was 23:25, while that on the DFS was 12:04, evidencing a time-lag of plus 11 hours, and the 21 minutes of the aircraft's flight to spray area and preparation for spraying.

Row 3 corresponds to the aircraft with tail number PNC 4007, code O. It may be seen that the time recorded by DelNorte software was 17:25, while that on the DFS was 12:04, evidencing a time-lag of plus 5 hours, and the 21 minutes of the aircraft's flight to spray area and preparation for spraying.

Row 4 corresponds to the aircraft with tail number PNC 4008, code P. It may be seen that the time recorded by DelNorte software was 12:25, and that on the DFS was 12:04, thus showing that the pilot set the offset correctly (GMT -5:00), and therefore there was no time-lag, but only the difference of the 21 minutes of the aircraft's flight to spray area and preparation for spraying.

Row 5 corresponds to the aircraft with tail number PNC 4011, code F. It may be seen that the time recorded by DelNorte was 22:25, while that on the DFS was 12:04, evidencing a time-lag of plus 10 hours, and the 21 minutes of the aircraft's flight to spray area and preparation for spraying.

Consequently, it may be seen that on the time recorded by the DelNorte software for the aircraft shown in Row 4, the offset was set correctly by the pilot and is thus consistent with the time recorded on the DFS."[355]

---

[355] CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, Section I, Analysis of Time Records, pp. 32-33.

2.254. The following sketch-map graphically depicts the preceding explanation:

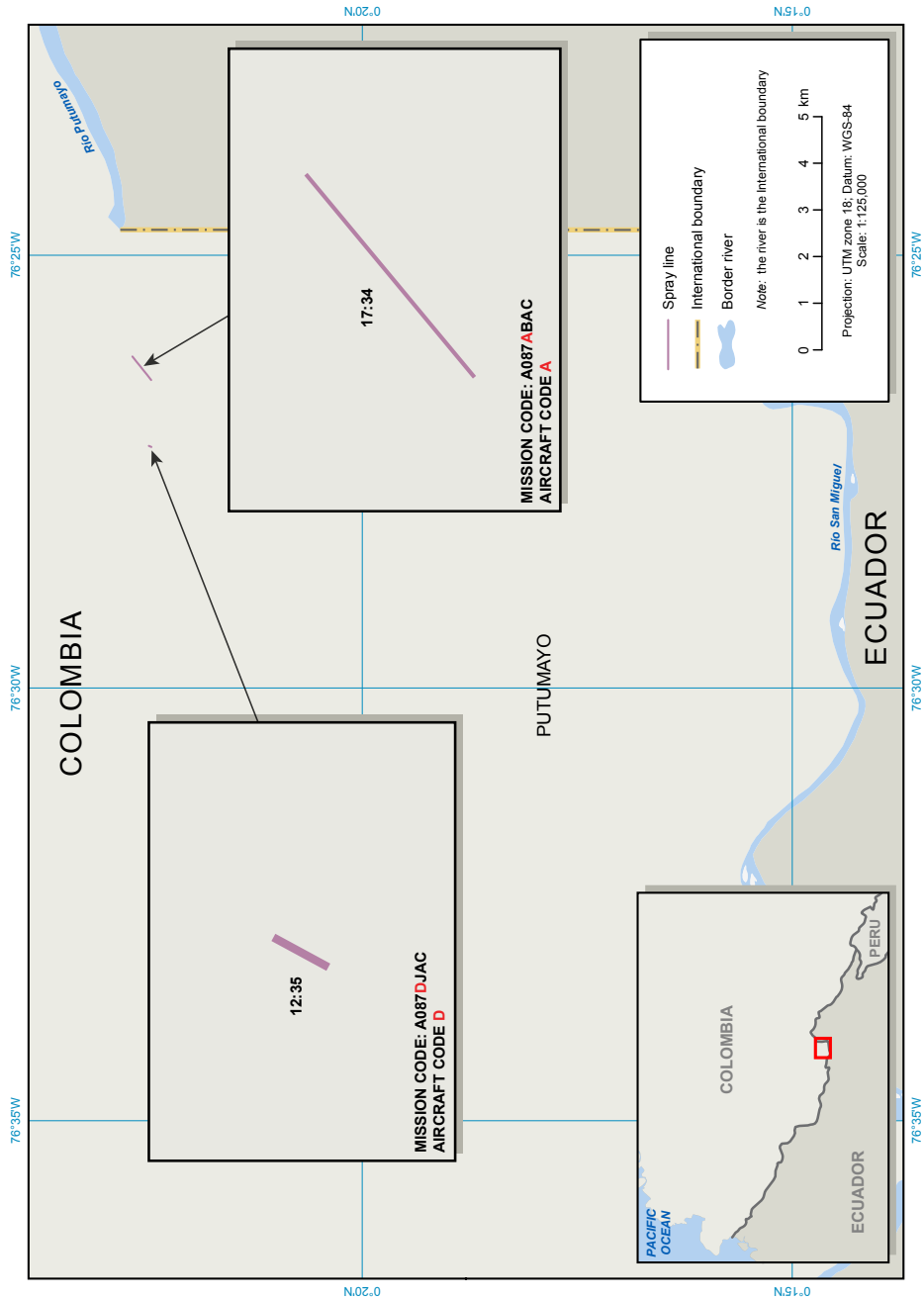


Figure 2-13 Graphic depiction of one spray mission with 2 aircraft from Larandia Spray Base on 8 January 2007, with differing time records in Delnorte

2.255. To conclude, none of the spray missions were conducted at night. That the times recorded by SATLOC or DelNorte software may indicate the contrary is due to a discrepancy caused by errors in the offset of the spray system's clocks. The example explained above is clear evidence of this and is consistent with the times recorded on the DFS for that spray mission.

2.256. It has been shown that Colombia has not conducted night time aerial spraying operations, as it stated in its *Counter-Memorial*. Ecuador's other arguments with regard to this issue, such as temperature inversions, are thus irrelevant. Moreover, they have been fully addressed by Colombia's expert on drift.[356]

(7) CONCLUSIONS ON DRIFT

2.257. Ecuador's arguments are built on the unwarranted assumption that the area up to 10-km adjacent to the border is the relevant area. However, as Colombia has shown, deposition due to drift effectively falls to zero within a few hundred metres. Thus, spray events at locations farther into Colombian territory are irrelevant for the analysis.

2.258. Ecuador assumes a variety of factors so as to maximize the expected deposition from spray drift, whilst ignoring a number of other relevant variables. In order to determine the

[356] With regard to temperature inversions and the fact that they do not increase the amount of spray drift, see CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), p. 9.

true extent of drift, variables that have a strong impact in reducing drift, notably the forest canopy and terrain elevations, wind speed and direction need to be properly accounted for. The presence of forest canopy is an essential feature of the relevant area. Also, meteorological analyses show that, for most of the year, predominant winds in the border area blow from Ecuador towards Colombia and their speeds are low.

2.259. Furthermore, Colombia has demonstrated that even in the case of the fastest spray events closest to the border, deposition due to drift in Ecuadorian territory was zero or insignificant and therefore could not have resulted in any of the damages complained of by Ecuador.

2.260. The Environmental Management Plan foresees a maximum flight altitude of 50 metres when spraying, *subject to geographical features or obstacles so as to avoid risks to the pilots*. Within this context, Colombia has demonstrated that in 86% of spray events, the height at which the spray was released was 50 metres or less, and only 1.2% (51) of the spray events were above 77 metres. Furthermore, Dr Hewitt modeled the highest spray events closest to the border and concluded that deposition in Ecuadorian territory was zero or insignificant, i.e., well below the levels of concern for sensitive animal and plant species.

2.261. By presenting fragmented and mismatched pieces of selected evidence, Ecuador presents only a distorted account of the true situation with regard to the management of the

Program's operations and the pilots' training and performance. Not only does Ecuador fail to substantiate establish any of its unwarranted conclusions on the basis of the State Department's observations as to Dyncorp's operations and the Program, but there is no causal link between the minor isolated criticisms of the operations and the adverse effects allegedly caused to Ecuador by spray drift.

2.262. As concerns droplet size, a very high percentage of the droplet sizes of the spray events in the relevant area are substantially larger than 150 μm, at the high end of the range of average diameter commonly involved in applications of pesticides to tree canopy foliage. In any case, the remaining 9.1% of spray events were also modeled by Dr Hewitt and the resulting deposition rates were insignificant.[357]

2.263. With regard to application rate, Dr Hewitt also modeled the relevant events with the result that deposition in Ecuadorian territory was zero or insignificant; therefore, it could not have caused the damages alleged by Ecuador.

2.264. Dr Hewitt ran the modeling for the spray events with high altitudes, speeds and application rates assuming that wind direction is always south, i.e. from Colombia towards Ecuador, and with a wind speed of 5.14 m/s (as used by Dr Giles), which is not usually the case under realistic conditions in the region. Even in this scenario, all the results showed deposition values well below the levels of concern for sensitive animal and plant

[357] See above, paras. 2.202-2.209, and 2.134-2.139.

species. Thus no damage could have been caused in Ecuador, which explains why Ecuador has failed to provide any evidence in support of its baseless claims.

2.265. It has been shown that Colombia has not conducted night time aerial spraying operations, as it stated in its *Counter-Memorial*. Ecuador's other arguments with regard to this issue, such as temperature inversions, are thus irrelevant. Moreover, they have been fully addressed by Colombia's expert on drift.

D. Conclusions

2.266. As Colombia has shown, the spray mixture and some of its individual components have been tested by the US EPA, the US Department of State, and by independent scientific studies such as those carried out for CICAD. The conclusions reached by these different tests and studies are the same: no significant risk of harm to human and animal health and the environment is posed by either the spray mixture as a whole or any of its components.

2.267. Likewise, in the course of the implementation of the PECIG, continuous monitoring and audits evidence compliance with the EMP which includes verification of the formula used and its effects. These audits and monitoring have consistently shown that the spray mixture does not cause adverse effects on human health or the environment.

2.268. Ecuador conveniently ignored or dismissed the studies that run directly contrary to its allegations. However, Ecuador's

case falls away when it is confronted with the entirety of the record and with the existing scientific evidence.

2.269. Colombia has also shown that deposition due to drift effectively falls to zero within a few hundred metres. Thus, spray events at locations farther into Colombian territory are irrelevant for the analysis. Ecuador assumes a variety of factors so as to maximize the expected deposition from spray drift, whilst ignoring a number of other relevant variables.

2.270. In order to determine the true extent of drift, variables that have a strong impact in reducing drift, notably the forest canopy and terrain elevations, wind speed and direction need to be properly accounted for. The presence of forest canopy is an essential feature of the relevant area. Also, meteorological analyses show that, for most of the year, predominant winds in the border area blow from Ecuador towards Colombia, i.e., there would be no drift towards Ecuador, and the predominant wind speeds are low.

2.271. Finally, as explained in detail above, Dr Hewitt's modelling of even the worst case actual spray events (high altitude, speed and application rate), with a wind speed of 5.14 m/s always blowing towards Ecuador, which is not usually the case under realistic conditions, resulted in insignificant deposition values, well below the levels of concern for sensitive animal and plant species. Thus no damage could have been caused in Ecuador, which explains why Ecuador has failed to provide any evidence in support of its baseless claims.

2.272. For all the reasons set out above, Ecuador's allegations that the spray mixture is highly toxic and causes significant harm, and that large quantities of the spray mixture from aerial sprayings in Colombia would have been deposited in Ecuador, are utterly misplaced and unfounded.

Chapter 3

ECUADOR HAS NOT SUBSTANTIATED ITS CLAIMS OF DAMAGE

A. Introduction

3.1. As Colombia has explained in its *Counter-Memorial* and has already touched upon in Chapter 2 of this *Rejoinder*, the scientific evidence shows clearly that the spray mixture was not capable of causing the types of harm to humans and animals alleged by Ecuador, nor was it capable of causing damage to plants in the minimal amounts which the modeling shows would have been deposited even by the closest spray events.

3.2. In the light of the spray data obtained from the US State Department, Ecuador does not now argue that the damage alleged was caused by direct overspray of Ecuadorian territory. As such, Ecuador's case is necessarily that the damage has been caused by the deposition within its territory of the spray mixture as the result of drift from spraying operations within Colombian territory.

3.3. However, in Chapter 2, Colombia has demonstrated that, contrary to the misleading picture Ecuador attempts to portray of the spray flight data (in particular as regards the height and speed at which the various individual spray events took place), the manner in which the spray program was conducted was such

that there was no significant deposition of spray mixture within Ecuadorian territory.[358]

3.4. Nevertheless, Ecuador continues to argue that the Court should conclude, on the basis of the sparse evidence that has been placed before the Court, that the damage alleged did occur, and further, that it was caused by the deposition of spray mixture due to drift from spraying within Colombia.

3.5. The principal basis on which Ecuador urges the Court to reach that conclusion is the evidence of the Ecuadorian witnesses as to the damage which they allege they either suffered themselves, or witnessed, and which Ecuador alleges is "corroborated" by other contemporaneous evidence (and this, according to Ecuador, independently of the spray data).[359]

3.6. In this Chapter, Colombia will show that there is a paucity of hard scientific evidence to support Ecuador's claims of damage; that Ecuador's witness evidence is unreliable, uncorroborated by the spray data and contradicted by the scientific evidence; that Ecuador's other supposedly corroborative evidence does not in fact show that damage occurred; and that Ecuador has failed to establish that damage occurred or, in any event, that it was caused by the deposition of spray mixture due to drift from spraying within Colombia. In sum, Ecuador's case on damage fails.

---

358 CCM, para. 7.33. See above, para. 2.32 and Chapter 2, Section C.

359 ER, paras. 3.9-3.114.

3.7. Although Ecuador, on the basis of a broad brush approach, alleges that the spray data supports its case insofar as there is a correlation between the locations in which spraying took place and the asserted locations of the witnesses, the spray data in fact substantially undermines both the testimony of the witnesses and the other evidence on which Ecuador seeks to rely. It shows that the various assertions made by Ecuador that damage was suffered within Ecuadorian territory, and that that damage was caused by spraying within Colombia, are not worthy of any credibility.

3.8. In this regard, Colombia has undertaken an analysis of the allegations of each of the witnesses relied upon by Ecuador as to the date and location of spraying: the analysis is contained in the Appendix to the present *Rejoinder*.

3.9. It bears reiterating at the outset that much of the witness evidence is entirely vague and unspecific as to the period in which the witnesses allege that they were oversprayed, or that spraying was very close to their locations, or that they suffered effects as a result of spraying. However, even on the basis of the broad time periods, involving one, two or even more years, which result from the evidence of the witnesses, the spray data demonstrates that in relation to the allegations of the witnesses, there was no spraying in Ecuadorian territory or over the San Miguel or Putumayo border rivers, or even sufficiently close to the locations in which they claim they were present that could have caused the harm alleged. In a significant number of cases, there was no spraying at all anywhere near the locations in

question at the relevant times. And of course, the spray data demonstrates there was no overspray, as claimed by many witnesses.

3.10. In this regard, Ecuador and its experts profess ignorance of the dates of the spray events included in the spray flight data.[360] On that basis, since most witnesses do not even mention a month, and their references to years are formulated in terms of a reference to a period "7 or 8 years ago", comprising several possible years, Ecuador in its *Reply* analysed the allegations of the witnesses solely on the basis of the information as to the year – and in very few cases as to the month – in which the individual spray events took place.

3.11. However, in fact the file name for each of the spray events recorded in the spray data indicates the precise date on which the event in question took place.[361] As a result, to the extent that the witnesses or other sources relied upon by Ecuador contain more or less precise allegations as to the date of spray events, it is possible to verify whether any spraying in fact took place as alleged. In a striking number of instances from which precise dates or specific periods are identifiable, there was no spraying anywhere close by.

3.12. Quite apart from the general lack of correspondence between the allegations of harm and the actual timing and

---

360 ER, Vol. II, Annex 1, pp. 1, 6; and see e.g. ER, fn. 327.

361 CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, Oct. 2011, p. 3, Figure 1 (Pilot's Spray Data Sheet).

location of the spraying, modeling of the spray events closest to the border using the accepted scientific methods utilised by Ecuador's own expert (corrected only to take account of the presence of substantial vegetation in the border area), demonstrates that no significant quantity of spray mixture was deposited within Ecuador such as is capable of causing the effects alleged.

3.13. Further, as will be shown, that conclusion is corroborated by analysis of satellite imagery, which demonstrates that spraying within Colombia did not cause any effects within Ecuador.

3.14. Given the nature of the evidence with which the Court has been presented by Ecuador, and the extent to which the veracity of that evidence is called into question by the spray data and other factors, it is open to the Court to conclude either that the evidence is simply unreliable insofar as Ecuador alleges that damage in fact occurred and it has not otherwise shown that such damage occurred, or to conclude that in any case, the alleged damage could have been caused by various other causes other than the spraying and/or could not have been caused by drift from spraying in Colombia. In either event, the result is the same.

3.15. The remainder of this Chapter is structured as follows;

Section B highlights the striking lack of any hard scientific evidence produced by Ecuador which shows the occurrence of *any* damage within Ecuador caused by

drift from spraying operations within Colombian territory.

Having set out introductory observations as to certain matters which cast doubt upon the independence of the witnesses put forward by Ecuador, and as to Ecuador's selective reliance on the allegations made by the witnesses, **Section C** examines in turn Ecuador's claims as to the four periods and areas in which damage was suffered; as will be shown, the allegations of the witnesses, and the other evidence upon which Ecuador seeks to rely, do not substantiate its case.

Section D provides an assessment of the flawed "scientific" evidence relied upon by Ecuador as to the supposed toxicity of the spray mixture, and contrasts it with the overwhelming body of scientific evidence. That evidence conclusively shows that, quite separately from the fact that there has been, at most, only minimal deposition of spray mixture within Ecuadorian territory due to drift, in any case, the spray mixture could not cause the effects as to humans and animals alleged by Ecuador

In the light of that evidence, and given the conclusive nature of the scientific evidence as to the non-toxic nature of the spray mixture to humans, animals and plants, **Section E** provides a summary assessment of

Ecuador's allegations as to the harm supposedly suffered.

Colombia also briefly addresses the particular allegations of harm put forward on behalf of Mr Victor Mestanza, which exceptionally contain precise and testable allegations as to the date of spraying and damage allegedly suffered as a result, and which are undoubtedly false.

Section F briefly sets out the conclusions of this Chapter.

B. The Absence of Hard Evidence of the Damage Alleged

3.16. It is a striking feature of Ecuador's case as to the alleged damage caused by Colombia's spraying that it is made principally on the basis of the testimony of witnesses, supposedly corroborated by secondary material which is itself entirely based on the testimony of individuals resident within the border region. Ecuador puts forward no hard scientific evidence either of the deposition of the spray mixture within its territory, or of the damage it alleges occurred.

3.17. In the face of the widespread damage allegedly caused by the drift of spray mixture, portrayed by Ecuador in near-apocalyptic terms, one would have expected that Ecuador would be able to put forward convincing and verifiable evidence of the alleged effects of the spraying in Ecuador. Spraying started in the regions of Colombia abutting Ecuador in 2000, continued

until 2005, and was briefly resumed for a few months in late 2006. If the damage were as widespread as Ecuador alleges, there would have been ample evidence documenting the harm, including scientific and/or medical evidence and studies, photographs, and other images of the damage caused.

3.18. Ecuador protests that it was unaware of the particular dates on which spraying was to take place in any given locality in Colombia, such that it was unable to collect any data.[362] However, there were officials of the Ecuadorian State in the regions in question. There is no reason why they could not have reported to the central Ecuadorian authorities when they became aware that spraying had taken place in the border regions of Colombia

3.19. Nor, if damage of the type and extent alleged had in fact occurred, is there any reason why the local authorities could not have been dispatched to document the damage as soon as it was reported, by taking photographs, taking soil samples for analysis, or otherwise. Ecuador's protestations in this regard are without any foundation; the lack of advance warning of the date and location of spraying clearly would not have prevented it from documenting the supposedly widespread damage caused after the event, if any damage had in fact occurred.

3.20. The lack of any scientific evidence is particularly striking as regards the alleged effects of the spraying in Esmeraldas in 2007. As discussed further below, the news

362 ER, para. 3.141.

reports relied upon by Ecuador demonstrate that members of the Ecuadorian military were aware that spraying was taking place within Colombian territory, and this information was reported up the chain of command to the highest levels. If damage had in fact been suffered, as Ecuador alleges, there is no reason why it could not have been documented.

3.21. It was of course always open to Ecuador to install monitoring stations at strategic intervals along the border. In this regard, it is notable that in October 2002, the Minister for the Environment was reported as having stated that

> "a network for environmental monitoring would be implemented in the border areas in two weeks. The aim is to prove whether the fumigations are affecting Ecuadorian territory, through measurements using instruments".[363]

3.22. Further, in December 2003, the President of Ecuador issued a decree,[364] setting up an Inter-Institutional Commission as a mechanism by which any effects in Ecuador of spraying within Colombian territory could be monitored.

3.23. However, Ecuador has not placed any evidence before the Court as to the results of any such monitoring. The clear inference is either that no such evidence exists (which belies the concerns Ecuador now expresses as to harm caused by the spraying within Colombia), or that such results exist, but are

---

[363] ER, Vol. IV, Annex 71.

[364] CR, Vol. IV, Annex 44: Ecuadorian Foreign Ministry Court Filing No. 937-2004, 22 Oct. 2004 (Presidential Decree 1151 of 2003, Article 2), at p. 6.

inconsistent with Ecuador's case in these proceedings and demonstrate that no effects were in fact felt within Ecuador.

3.24. Colombia has previously made reference to the sampling conducted in late 2004 by members of the Ecuadorian Atomic Energy Commission, on the basis of which Ecuador publicly stated that no effects had been felt within Ecuador.[365] Ecuador's response is to state that that testing proves nothing, since there had been no spraying in the relevant areas for some considerable time prior to the dates on which the samples were taken.[366] By necessary implication, Ecuador thus apparently accepts that glyphosate and AMPA are unable to cause any long-lasting effects on soil productivity, or consequently on crop yields.

3.25. That is clearly right, and is corroborated by other testing of samples carried out by the Ecuadorian authorities from the border regions during 2004. The results of the tests conducted on the soil samples concluded that:

(a) loss of productivity of plants grown in the areas from which samples were taken was due to the poor quality and composition of the soil in the Amazonian region, and not due to any effects of the spraying; [367] and

(b) damage observed on crop samples provided by a number of border communities, rather than being

365 CCM, paras. 5.45-5.63. See above paras. 2.30-2.31.
366 ER, paras. 3.30-3.32.
367 CR, Vol. IV, Annex 44: Ecuadorian Foreign Ministry Court Filing. No. 937-2004, 22 Oct. 2004, pp. 20-21.

> caused by spraying, were due to fungi and bacteria.[368]

3.26. Similarly, although Ecuador protests long and hard about the lack of health facilities in the border region,[369] it has failed to produce any credible medical evidence of the actual health conditions in the border regions, or more significantly, that any symptoms suffered by residents of the region are attributable to spraying within Colombia.

3.27. In this regard, once again, it is not to the point that Ecuador may have been unaware of the precise dates of spraying. If the inhabitants of the border regions in Ecuador had in fact suffered the supposedly wide-spread medical problems now alleged by Ecuador as a result of spraying within Colombia, one would have expected Ecuador to have been able to produce extensive medical evidence of the conditions in question. This it has not done. The most Ecuador does is rely on a handful of "medical inquest" questionnaires;[370] those questionnaires contain leading questions as to the association between the alleged symptoms and spraying, and, even if compiled by medical professionals, as Ecuador asserts (albeit without providing any proof),[371] appear to have been completed without any proper or thorough professional medical examination of the individuals in question, or of their medical history. As such,

---

368 CR, Vol. IV, Annex 44: Ecuadorian Foreign Ministry Court Filing No. 937-2004, 22 Oct. 2004, pp. 20-21.
369 ER, para. 3.42.
370 ER, Vol. III, Annex 31.
371 See, ER, paras. 3.46; 7.13.

Ecuador has failed to put forward any proper medical evidence of the harms to health supposedly suffered by the population in the border.

3.28. Strikingly, even as regards those individuals who have agreed to appear as witnesses on Ecuador's behalf in these proceedings and who allege that they suffer persistent health problems as a result of the spraying, no medical reports have been placed before the Court supporting the allegations of the witnesses that they in fact continue to suffer from the symptoms alleged. Nor has any medical evidence been put forward that those symptoms have anything to do with the alleged exposure to the spray mixture.

3.29. Rather, Ecuador has chosen to rely on the bare assertions of those witnesses both as to the health problems that they have allegedly suffered, as well as their unsupported allegations that these problems are caused by the spraying. Ecuador's failure to put forward any medical evidence in support of these claims speaks for itself.

3.30. What there is ample evidence about, though, as explained in Section E, below, is that precisely the health problems that Ecuador, without any basis, attributes to the spraying in Colombia are widespread in the border area, albeit due to other causes. In particular, this is confirmed by an

analysis of the health situation on the border, conducted jointly by Colombia and Ecuador with WHO/PAHO involvement.[372]

3.31. Likewise, a study under the auspices of FLACSO-Ecuador attributes many of the diseases present in the northern border regions of Ecuador, particularly in the Awá indigenous reserve, to the mining, logging and African Palm oil industries, as a result of water and soil contamination due to the chemicals used in those activities.[373] According to the study: "The commonest symptoms are: headaches, stomach aches, diarrhea, fever, vomiting, pain in the eyes";[374] similarly the study records that "[s]kin blotches and headaches are the common symptoms."[375]

C. The Witness Evidence Relied upon by Ecuador is not Credible

3.32. In the absence of any scientific, medical or other hard contemporaneous evidence of deposit of spray mixture within its territory, or of damage allegedly caused by spraying, the foundation of Ecuador's case that spraying within Colombia resulted in damage is the statements of the witnesses. In an attempt to bolster that flimsy evidence, Ecuador alleges that the

---

372 CR, Vol. VI, Annex 64: Organismo Andino de Salud, Hipolito Hunanue Agreement, *Analysis of Health Situation in the Border, Pacific/Andean Corridors Nariño/Tulcán - San Lorenzo (Colombia - Ecuador),* 2009. See below, paras. 3.248; 3.425-3.436.

373 CR, Vol. VI, Annex 65: Pineda-Medina, Juan and Naizot, Anne-Lise/ FLACSO-Ecuador, *Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño,* pp. 195-220.

374 *Ibid.,* p. 189 (Health).

375 *Ibid.,* p. 199 (Health).

witness evidence is substantially corroborated by other evidence, including contemporaneous press reports, the reports of NGOs, and the conclusions of UN Special Rapporteurs, as well as arguing that the spray data obtained from the US State Department corroborates both the allegations of the witnesses, as well as the allegations contained in the secondary material.[376]

3.33. In the present section, Colombia shows that both the witness evidence, as well as the supposedly corroborative evidence, are simply not worthy of any credibility.

(1) General assessment of the witness statements

3.34. Quite apart from their contents, there are numerous elements apparent on the face of the various witness statements which calls into question their credibility. First, all of the witness statements were given many years after the alleged facts, in some cases, as much as nine years.

3.35. Second, even a cursory study of the various statements reveals that they have similar characteristics, and follow essentially the same structure, consisting of

a) a description, which in many cases is similar, and in some cases even uses exactly the same terms, of their alleged experience of the aerial herbicide spraying; in almost all cases, the witnesses provide only a vague indication as to the dates

[376] ER, paras. 3.5-3.7. See also ER, Chapter 3, Section I.

and the location at which spraying is alleged to have occurred;

b) allegations as to the impact on the health of the witness and members of their family, providing similar descriptions of the supposedly serious and – in some cases – long-lasting effects. Some of the witnesses even allege the death of small children and adults as a direct result of spraying, although, as shown in Chapter 2 and discussed further below, such effects cannot be caused even as a result of direct overspray;

c) allegations as to the impact of the spraying on crops (with some witnesses belonging to indigenous communities referring to medicinal or traditional plants). In this regard, many of the witnesses use nearly identical terms to refer to purported effects such as loss of productivity in soils, in particular using the formulation that their crops yielded a particularly quantity (expressed in *quintales*) before the spraying, as compared to a (lesser) quantity (again expressed in *quintales*) following the alleged sprayings;

d) allegations as to the impact of the spraying on domestic animals (with some witnesses referring to the alleged effects on wild fauna). The witnesses describe, in very similar fashion, effects such as animal deaths, loss of hair,

disappearance of species of wild animals, etc. that, as discussed below, could not be caused even as a result of exposure to the spray mixture due to direct overspray. The coincidence of the accounts of the witnesses in describing effects that simply cannot have occurred is striking.

e) a section on other alleged adverse effects, whether on the economy of the region, indigenous traditions, or in terms of displacement of the population. Since it has been shown that there was no spraying in Ecuador and that there would have been no or insignificant deposit of spray mixture due to drift, it is quite clear that these other alleged adverse effects simply could not have occurred; the economy of the region could not have been affected, nor could population displacement in Ecuador have ensued as a consequence of the spraying in Colombian territory;

f) allegations to the effect that, prior to the alleged sprayings, the witnesses "had never seen anything similar" to the purported effects they describe.

3.36. Further, a number of the statements use technical terms which one would not expect farmers or agricultural workers in a rural area, let alone members of indigenous populations, to use. For instance, the repeated use of terms such as "escoltados"

(escorted), "espacio aéreo" (airspace) and "sobrevolaron" (overfly) is striking.

a) Witness 9 refers to the fact that "The planes came *escorted* by helicopters" ("Los aviones venían *escoltados* por helicópteros")[377]

b) Witness 2 states that he saw planes accompanied by helicopters flying over the San Miguel River, and that, "when turning around, they would overfly Ecuadorian territory" ("al dar la vuelta *sobrevolaban* el territorio de Ecuador").[378] Witness 14 alleges, in Ecuador's translation, that the first time he saw spray planes, "I saw them fly over the San Miguel River" ("yo vi que *sobrevolaron* por encima del Río San Miguel"), although this is more accurately translated as "I saw that they overflew the San Miguel River".[379] Similarly Witness 17 states that he "saw two planes accompanied by helicopters fly over our community" ("vi que dos avionetas accompañadas de helicópteros *sobrevolaron* por encima de nuestra comunidad").[380] Although adequately translated in a literal fashion into English by Ecuador as "fly over", this does not fully convey the technical nature of the term in

377 Statement of Witness 9, EM, Vol. IV, Annex 197.
378 Statement of Witness 2, EM, Vol. IV, Annex 190.
379 Statement of Witness 14, EM, Vol. IV, Annex 202.
380 Statement of Witness 17, EM, Vol. IV, Annex 203.

Spanish; the more common usage would be "volar sobre" or "volar encima de";

c) Witness 5 claims that he saw planes flying over Salinas, and in that regard comments "Las avionetas no respetaron nuestro *espacio aéreo*. Ingresaron a *nuestro territorio* mientras pasaban fumigando para dar la vuelta para Colombia" ("The planes did not respect our airspace. They entered our territory as they were spraying to turn around toward Colombia").[381]

3.37. The reason for the consistent structure of all of the statements, the high standard of Spanish and the incongruous use of technical terms, would appear to be that the statements of the various witnesses were carefully prepared and collated in advance by members of Ecuador's legal team, those prepared statements were then provided to the various notaries public, who simply copied the text into the sworn statements which have been put forward by Ecuador, which were then signed by the witness. As much is clear from a number of factors, in particular, the dates on which the various statements were supposedly sworn by the witnesses.

3.38. In total, seventeen of the statements of witnesses (those of Witnesses 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 20, 21, 22, 23 and 29),[382] were sworn on a single day, 16 January 2009, in

[381] Statement of Witness 5, EM, Vol. IV, Annex 193.

[382] EM, Vol. IV, Annexes 189, 190, 193, 194, 195, 196, 197, 198, 199, 200, 201, 203, 206, 207, 208, 209 and 213.

Nueva Loja by the notary public of the First Notary Public's Office of Lago Agrio Canton, Dr José María Barrazueta Toledo. Simply on the basis of the cumulative length of the individual statements sworn on 16 January 2009, it is evident that the statements could not all have been taken orally from the witnesses, prepared, and formalised by the notary public in a single day.

3.39. As a consequence, it seems clear that the various sworn declarations were created using prepared statements which were simply copied by the notary. That the notary public simply adopted and incorporated a pre-prepared statement in relation to each of the Ecuadorian witnesses whose statements are dated 16 January 2009 is confirmed by a number of other factors.

3.40. First, each sworn declaration, after standard introductory clauses prepared by the notary public which detail the identity of the maker of the statement, then reproduces the text of the sworn declaration enclosed in quotation marks: "…". Each declaration starts with a formal request to the notary to include the sworn declaration within the register of public writings kept by him, followed by a first "clause" in which the personal details of the maker of the statement are again set out, followed by a second "clause" containing the substance of the sworn declaration itself, before concluding with a third "clause" affirming the value of the declaration.

3.41. By way of example, the sworn statement of Dr Dino Juan Sánchez Quishpe, made on 15 January 2009, which is in

similar form to the statements made on 16 January 2009, commences as follows:

> "In the city of Nueva Loja, provincial capital of Sucumbíos, Republic of Ecuador, on this fifteenth day of January of the year two thousand and nine, before me, **DOCTOR JOSÉ MARÍA BARRAZUETA TOLEDO, Acting Notary Public of the First Notary Public's Office of Lago Agrio Canton,** appeared Doctor Dino Juan Sánchez Quishpe, Ecuadorian, a doctor of medicine, married, domiciled in the city of Nueva Loja, of legal age, without any legal impediment to declare, to ask me to convert his declaration into a public instrument, the same as follows: "**MR. NOTARY PUBLIC:** Please include in the Registry of Public Instruments under your custody a declaration, contained in the following clauses: **FIRST: PARTY HERETO.-** For the execution of this public instrument, appears Doctor Dino Sánchez, of Ecuadorian nationality, bearer of identity card number one seven zero seven nine nine zero three five dash two, of legal age, domiciled in the city of Nueva Loja, legally able to enter into and be bound by contracts, on his own right; **SECOND: [SWORN] DECLARATION.-** Freely, voluntarily, and under oath, the deponent declares the following: My name is Dino Sánchez. […]"[383]

3.42. Second, further proof or corroboration of the fact that the statements were prepared in advance of the meeting with the Notary Public results from the fact that, in addition to incorporating what purports to be the spontaneous statement of the witness, each of the statements made on 16 January 2009 also incorporates a request in identical terms to the notary –

[383] Statement of Dr Dino Juan Sánchez Quishpe, EM, Vol. IV, Annex 188.

which the notary has helpfully transcribed in full – made not by the witness themselves, but apparently by a member of Ecuador's legal team,[384] Dr Íñigo Salvador Crespo. Incidentally, it may be noted that Dr Salvador Crespo is the brother of Maria Isabel Salvador Crespo, Minister of Foreign Affairs of Ecuador at the time of the filing of its Application before the Court. That request contained in the various statements provides:

> "Mr. Notary Public, please add the customary clauses for the full validity of this public instrument.- Signed by Doctor Íñigo Salvador Crespo, Bar Association Number two thousand nine hundred and thirty-eight, Bar Association of Pichincha."[385]

3.43. The statements made on 16 January 2009 are not the only statements put forward by Ecuador which were obviously prepared in advance with the involvement of Dr Salvador. The same is true of the following statements likewise sworn in Nueva Loja before Dr José María Barrazueta Toledo:

- the sworn declaration of Witness 4, dated 22 December 2008;[386]
- the sworn declaration of Witness 18,[387] and the sworn declaration of Dr Dino Juan Sánchez

---

[384] CR, Vol. VI, Annex 66: Press item: "Legal Action. Ecuador accuses Colombia before The Hague." Migalhas Latinoamericanas, 1 Apr. 2008.

[385] E.g. Statements of Witnesses 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 20, 21, 22, 23 and 29: EM, Vol. IV, Annexes 189, 190, 193, 194, 195, 196, 197, 198, 199, 200, 201, 203, 206, 207, 208, 209 and 213, respectively.

[386] EM, Vol. IV, Annex 192.

[387] EM, Vol. IV, Annex 204.

Quishpe[388] (referred to above), both dated 15 January 2009;

- the sworn declarations of Witnesses 3, 14 and 19, sworn on 17 January 2009;[389]
- the sworn declarations of Witnesses 26, 27 and 28, sworn on 17 February 2009;[390] and
- the sworn declaration of Witness 31, sworn on 27 February 2009.[391]

3.44. Similarly, the sworn statements of Witnesses 40 and 41, both originally from Mataje Alto, notarised by José Fabian Simbaña Ayabaca, First Notary of the Canton of Otavalo (a region located some distance from the border region) on 20 February 2009,[392] follow an analogous format to those notarised by Dr Barrazueta in Nueva Loja. Again, the two sworn declarations end with the transcription of the request signed by Dr Íñigo Salvador Crespo to add the normal clauses in order to ensure the full validity of the declaration as a public instrument.

3.45. In the case of these two statements, quite apart from the factors set out in the preceding paragraphs, there can be no doubt that they were transcribed from a pre-prepared statement. In each of them, at the outset, the notary expressly notes that he was requested

388 Statement of Dr Dino Juan Sánchez Quishpe, EM, Vol. IV, Annex 188.
389 EM, Vol. IV, Annexes 191, 202 and 205.
390 EM, Vol. IV, Annexes 210, 211 and 212.
391 EM, Vol. IV, Annex 215.
392 EM, Vol. IV, Annexes 223 and 224.

> "to convert into a public instrument the declaration, *which has been faithfully copied* and is as follows […]" (emphasis added).

3.46. Finally, also worthy of mention in this connection is the sworn declaration of María Blanca Chancosa Sánchez,[393] which alone among the statements of the Ecuadorian witnesses clearly and unambiguously indicates the process followed. Following the normal introductory clauses, the sworn declaration itself is short, consisting of a request to the notary to record in the register of public acts a sworn declaration "contained in the following clauses and provisions" ("contenida en las siguientes cláusulas y estipulaciones"). The first "clause" is again a recital, substantially repeating information, already set out previously in the document, as to the identity of the person making the statement. The second clause incorporates by reference the attached "Statement of María Blanca Chancosa Sánchez", which is then annexed to the sworn declaration itself. Finally, there then follows a record of the request, again signed by Dr Íñigo Salvador Crespo, which obviously formed a part of the original document presented to the notary, that she should "add the customary clauses and qualifying documents for the full validity of this public instrument".

3.47. The remaining sworn declarations of eight Ecuadorian witnesses (Witnesses 30, 32, 33, 34, 36, 37, 38 and 39)[394] were made before the Fifth Notary Public of the Canton of Esmeraldas, Abg. Alfredo Rivero Drouet. By contrast to the

---

393 EM, Vol. IV, Annex 187.

394 EM, Vol. IV, Annexes: 214, 216, 217, 218, 219, 220, 221 and 222.

declarations made in Nueva Loja and Otavalo, the statements do not on their face bear the same obvious indications that they were made on the basis of pre-prepared statements: they do not recount the same instructions to the notary, nor do they incorporate any request addressed to the notary signed by Dr Salvador.

3.48. However, there is good reason to believe that those sworn declarations were likewise made on the basis of statements prepared in advance by members of Ecuador's legal team. First, as with the other declarations, each declaration made in Esmeraldas follows a curiously identical order; they each proceed to deal with imprecise allegations of herbicide spraying, the alleged impacts on human health, the alleged impact on water sources, crops and animals. Some of them deal in their final paragraphs with additional matters, including other alleged effects, notably displacement of the population.

3.49. Further, all eight declarations are stated to have been made on the same date, 19 February 2009. Whilst the statements made in Esmeraldas are somewhat shorter than those made in Nueva Loja, it is still inherently unlikely that the notary public would have been able to take the "spontaneous" oral statements and produce notarised sworn declarations of eight individuals in a single day.

3.50. The obvious inference from the various factors noted above is that members of Ecuador's legal team selected the various witnesses, interviewed them, and then prepared their

statements well in advance of the actual dates on which the statements were formally notarised. Thereafter, given the distances between the places of residence of the various witnesses and the offices of the relevant notaries public, the various witnesses would have had to be rounded up and transported to the office of the notary to swear their statements.

3.51. In that latter regard, it is clear that the sworn declarations were produced *en masse* on a small number of days. With the exceptions of the statements of Maria Blanca Chancosa Sanchez, made before a notary public in Quito on 14 January 2009,[395] and the statement of one witness from Salinas (witness 4), who made a sworn declaration in Nueva Loja on 22 December 2008, the short periods of time during which the Ecuadorian witnesses made their sworn declarations at the offices of the various provincial notaries public are telling.

3.52. In a first three-day period between 15 and 17 January 2009, a total of 20 of the witnesses whose statements have been submitted by Ecuador had their sworn declarations notarised in Nueva Loja by Dr Barrazueta, as follows:

- On 15 January 2009, Dr Dino Sánchez, and one witness from San Francisco I (Witness 18);
- On 16 January 2009, the majority of the witnesses resident in Salinas (witnesses 1, 2, 5, 6, 7), together with witnesses from other nearby towns including

[395] Although the cover of the public instrument reads that it was issued on 16 January 2009, and immediately thereafter, also reads: Quito 11 November 2008. EM, Vol. IV, Annex 187.

Corazon Orense (witnesses 8 and 9), Puerto Mestanza (witness 10), Puerto Escondido (witnesses 20, 21, 22, 23) and San Francisco II and communities in the region (including La Cóndor and La Carchi (witnesses 11, 12, 13, 17), as well as one witness from the Avié community of the Cofán Reserve (witness 29)

- On 17 January 2009, a further witness from Salinas (witness 3), together with two witnesses from San Francisco I and II (Witnesses 14 and 19).

Thereafter, in a second period of activity lasting just four days,

- On 17 February 2009, further witnesses from the Avié community of the Cofán reserve (witnesses 26, and 27), and a witness from Yana Amarum (witness 28) made sworn declarations in Nueva Loja before Dr Barrazueta in Nuevo Loja,
- Two days later, on 19 February 2009, the activity then apparently shifted to Esmeraldas (some 80 miles, it may be noted, as the crow flies from Mataje), where the eight witnesses from Mataje (witnesses 30, 32, 33, 34, 36, 37, 38 and 39) made their sworn declarations before Abg. Alfredo Rivera Drouet;
- Finally, on 20 February 2009, Witnesses 40 and 41, previously from Mataje Alto but who had moved away from the border region, made their sworn

declarations before José Fabian Simbaña Ayabaca in Otavalo.

On the basis of the above, it is clear that, at the least, members of Ecuador's legal team were closely involved in and coordinated the preparation and notarisation of the sworn declarations of not less than 30 of the 38 witnesses put forward by Ecuador in these proceedings.[396]

3.53. However, as also noted above, even as regards the remaining eight statements, made by witnesses from Mataje who swore their statements before Abg. Drouet in Esmeraldas, there is reason to believe that there was likewise input from the Ecuadorian legal team. All made their sworn declarations on the same date and all have similarities in structure. Further, all of the witnesses must have been transported or been instructed make their own way to Esmeraldas on the same day. The clear inference to be drawn is that, as with the other witnesses there was careful organization by members of the Ecuadorian legal team in the making of the statements. Accordingly, there is no reason to think that the process followed was in fact any different from that adopted in relation to the production of the other statements and that members of Ecuador's team were not likewise closely involved in the preparation of their statements.

3.54. Although the sworn declarations do not state what fees were paid for the conversion of the statements of the witnesses

[396] The remaining witness statements filed by Ecuador are supposedly from Colombian nationals, concerning events allegedly taking place exclusively in Colombia which, in any event, fall outside the scope of the present proceedings.

into public instruments, some fee was almost certainly payable. Given that almost all the witnesses are rural workers with only limited income, Colombia is left to wonder who paid those fees. There is no information as to what other incentives were provided to the witnesses to persuade them to give their evidence.

3.55. The fact that the sworn declarations appear to have been carefully prepared and drafted in advance of the making of the statement before the notaries, with, at the least, the assistance of members of Ecuador's legal team, clearly has implications for their credibility. In particular, it casts the coincidences between the various statements, and the similarity of the testimony of the witnesses, in a different light.

3.56. In these circumstances, Ecuador's reliance on the fact that the witness statements show "the repeated occurrence of the same symptoms across the various towns affected on the border of Ecuador"[397] as indicating their independence and their mutually corroborating nature, and its similar reliance upon the substantial coincidence of the accounts of witnesses resident in Mataje and Salinas, some 250 kilometres apart,[398] is misplaced, and the similarities do nothing to reinforce the credibility of the evidence. Rather, the coincidences undermine it.

3.57. There is a further aspect of the witness statements in these proceedings which casts doubt on the independent and

397 ER, para. 3.46.
398 ER, para. 3.123.

objective nature of the evidence which the witnesses have provided to the notaries public. As discussed in further detail below, a number of the questionnaires completed and filed by those witnesses who are also plaintiffs in the *Dyncorp* proceedings[399] contain far more precise allegations as to the dates of spraying, making allegations as to specific years, and in some cases, specific months and even dates. Those questionnaires were compiled at various points during the course of 2008. Yet inexplicably, less than a year later, in their statements in these proceedings, the same witnesses are reduced to alleging that spraying took place in far more vague periods.

3.58. Quite apart from the circumstances in which the witness statements in the present proceedings appear to have been collected, there are a number of other explanations for the supposed striking similarity of the accounts of the various witnesses, and other circumstances that give rise to concern as to contamination of the evidence of witnesses. As such, there are other clearly plausible explanations for the similarity of the accounts of the various witnesses.

3.59. In particular, it is apparent from the evidence filed by Ecuador that NGOs opposed to the spraying were particularly

[399] By letter from the Registrar dated 29 November 2011, Colombia was informed that, with regard to any witnesses who may also be plaintiffs in the *Dyncorp* proceedings, the Court accepted Colombia's proposals of 17 August 2011. Accordingly, as proposed by Colombia, the questionnaires of relevant witnesses are annexed to the present *Rejoinder* in redacted form, with all information permitting identification of the individual witness removed. The questionnaires are labelled with the number used by Ecuador to refer to the witness in question. Unredacted versions of the questionnaires have been filed with the Court. In addition, the Court is respectfully referred to the Confidential Addendum.

active in the border region from the start of the spraying program in 2000, seeking to document the alleged harms of the spraying program. In this regard a number of the individuals who have given evidence before the Court in these proceedings expressly state in their questionnaires in the *Dyncorp* proceedings that they had first learnt about the spraying program from meetings with NGO representatives.

3.60. For instance, in her questionnaire for the *Dyncorp* proceedings, Witness 9, a resident of Corazon Orense, states that she found out about the Plan Colombia spraying from Colombian friends at meetings at the school.[400]

3.61. Similarly, Witness 13,[401] a resident of San Francisco, stated in her Questionnaire in the *Dyncorp* proceedings that she became aware of the Plan Colombia program from Dr Adolfo Maldonado. In that regard, it is to be noted that the joint CONAIE / *Acción Ecológica* Report[402] records a meeting in the school in San Francisco II on 20 July 2001.

3.62. As is apparent from other evidence filed by Ecuador in these proceedings, Dr Maldonado is an activist who had been extensively involved in the early "verification" missions in the border area in the early years of the spraying program, including

---

[400] CR, Vol. VI, Annex 68: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 197, Witness 9).

[401] CR, Vol. VI, Annex 71: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 201, Witness 13).

[402] EM, Vol. IV, Annex 162.

in interviewing local residents in the communities along the border for various NGOs, in particular *Acción Ecológica*.[403]

3.63. Quite apart from the risk of contamination of evidence from the activities of external (including international) environmental NGOs, it is clear that there were a number of local *campesinos* and indigenous advocacy and "defence" groups active in the area.[404]

3.64. In order to illustrate the clear risk that the witnesses may have repeated second-hand accounts of the spraying, it is sufficient to take one allegation which recurs in a number of witness statements by way of example.

3.65. A striking number of the witnesses allege that they saw planes releasing "white smoke". This is the case for instance of Witnesses 5, 6 and 7 (Salinas); Witness 9 (Corazon Orense); Witness 12 (San Francisco II); Witness 22 (Puerto Escondido); Witnesses 27 and 29 (Avié Community (Cofán-Bermejo)); Witness 31 (Sukie Kankhe); and Witness 38 (Mataje). Ecuador relies on the supposed consistency of the accounts in this regard

---

403 EM, Vol. IV, Annexes 162, 164 and 165; ER, Vol. III, Annex 32.

404 See e.g. EM, Vol. IV, Annex 162, referring to, *inter alia*, CONAIE (Confederation of Indigenous Nationalities of Ecuador), RAPAL (Action Network for Alternatives to Pesticides in Latin America), FOKISE (Federation of Kichwa Organizations of Sucumbíos, Ecuador), FEINCE (Federation of the Cofán Indigenous Nationality of Ecuador) and ASCIS (Association of the Civil Society of Sucumbíos); EM, Vol. IV, Annex 164, referring to the "Santa Marianita" Association of Campesinos; ER, Vol. IV, Annex 70, referring to the "Asociación de Campesinos Palmeras Fronterizas" association.

as showing the truthfulness of the statements of the various witnesses.[405]

3.66. However, as shown by the analysis of the spray data in the Appendix "Analysis of Ecuadorian Witness Statements as to Timing and Location of Spraying and Alleged Effects", many of those witnesses who allege having seen planes spraying "white smoke" state that they reside in locations which are some considerable distance from the nearest sprayings conducted in Colombian territory, and in many cases at a distance of several kilometres from the San Miguel River which constitutes the border.

3.67. Quite apart from the associated allegations of overspray made by some of these witnesses, which, as discussed in detail further below, are clearly untrue, their allegations of having seen planes engaged in spraying, and having seen them release white smoke, are simply not credible.

3.68. As set out in Chapter 2, the planes engaged in spraying operations do on occasion release white smoke ("beeper", caused by burning fuel), for the purpose of ascertaining meteorological conditions, including in particular wind speed, and the extent of drift prior to actual spraying operations. As shown in the pictures at Figures 2-11 and 2-12 there is a clear difference between the appearance of "beeper" and the actual spray mixture, which rather appears as a clear mist. The spray

405 ER, para. 3.124.

mixture itself does not present the characteristics of "white smoke".

3.69. However, given the locations at which the witnesses state they were, and the distance from the nearest spray lines in the periods indicated in their statements, it is inherently unlikely, if not impossible that many of the witnesses who refer to having seen "white smoke" could actually have done so.

3.70. For instance, Witness 5, resident in Salinas, alleges having seen "white smoke" being emitted by planes spraying over Salinas in 2001.[406] However, quite apart from the fact that there was clearly at no point any spraying within Ecuadorian territory over Salinas, in 2001, the closest sprayings which took place in Colombian territory were conducted a considerable distance away.

3.71. In this regard, it should be noted that analysis of satellite imagery revealed no trace of a human settlement in the location of Salinas indicated by Ecuador in the figures in its *Reply*, although a community was visible a short distance away. Accordingly, in what follows, when discussing the distance of spray events from Salinas, Colombia gives measurements for the distance of the spray events from both locations.

3.72. Proceeding on that basis, the distance from the closest spray events to either of the two alternative locations for Salinas during the course of 2001 were of between 2,750 and

406 EM, Vol. IV, Annex 193.

3,131 metres from the closest point on the Ecuadorian bank of the border river; and the distance of those spray events from the alternative locations for the community was greater, ranging between 3,050 and 4,481 metres.[407]

3.73. As for Witness 9, from Corazón Orense, if she is to be understood to be referring to 2001 when she claims that "about 7 or 8 years ago", she saw planes "escorted by helicopters" which "seemed to be flying by the edge of the river, releasing a white smoke",[408] the closest spray events in Colombian territory in that year were at distances from the closest point on the Ecuadorian bank of the border river near the village ranging from 1,850 metres to 1,130 metres, and were between 6,200 and 6,085 metres from Corazón Orense itself.[409] If she is to be understood as referring to 2002, the distances of the closest spray events to the Ecuadorian bank on the border river were even ranged between 2,720 and 3,090 metres; and between 4,640 and 5,125 metres from the community.[410] Similarly, Witness 12 in her statement affirms that she resides in San Francisco II, about 2 km from the border, but claims that in 2002, she saw planes in the air and that "[o]ne could clearly see

---

[407] CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, p. 64-65, Fig. 2; see also CR, Vol. I, Appendix: *Analysis of Ecuadorian Witness Statements as to Timing and Location of Spraying and Alleged Effects*, pp. 42-43, Fig. 2.

[408] EM, Vol. IV, Annex 197.

[409] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 68-69, Fig. 4; see also CR, Vol. I, Appendix, pp. 68-69, Fig. 4.

[410] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 70-71, Fig. 5; see also CR, Vol. I, Appendix, pp. 70-71, Fig. 5.

that they were releasing a white smoke".[411] However, during 2002, the closest spray event was 467 m from the closest point on the Ecuadorian bank of the river – which, added to the 2 km from the border at which the witness claims her house is located, would mean that she was at least 2.5 km away from the closest spray event – and 3,050 from San Francisco II itself.

3.74. Witness 38, resident in Mataje, states that he was working on his farm "inland from the river" in 2000 when he saw planes "releasing a white smoke".[412] However, in 2000, there was no spraying anywhere close to Mataje such that Witness 38 could plausibly have seen planes nor the "white smoke" in the manner he alleges: the distance of the spray line closest to the current location of Mataje was 5,660 metres; that spray event was 4,560 metres from the closest point on the Ecuadorian bank on the border river.[413]

3.75. As such, the allegations of these witnesses of having seen planes emitting "white smoke" are inherently incredible. The most plausible explanation for their assertions in this regard is that they had heard accounts of planes emitting beeper, and repeated what they had heard in an attempt to bolster the credibility of their accounts.

---

411 EM, Vol. IV, Annex 200.

412 EM, Vol. IV, Annex 221.

413 CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, pp. 95-96, Fig. 20; see also CR, Vol. I, Appendix: *Analysis of Ecuadorian Witness Statements as to Timing and Location of Spraying and Alleged Effects*, pp. 240-241, Fig. 20.

3.76. As the Court emphasised in *Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)*:

> "witness statements produced in the form of affidavits should be treated with caution. In assessing such affidavits the Court must take into account a number of factors. […] where there would have been no reason for private persons to offer testimony earlier, affidavits prepared even for the purposes of litigation will be scrutinized by the Court both to see whether what has been testified to has been influenced by those taking the deposition and for the utility of what is said."[414]

3.77. On the basis of the matters set out above, there are clear grounds for treating the statements in the present case with "caution", and further grounds result applying the matters identified by the Court. Taking the various factors identified by the Court in turn, the sworn declarations made by the various Ecuadorian witnesses were self-evidently prepared for the purposes of the present litigation many years –in some cases as much as nine years - after the alleged facts. But if the facts contained therein are true, there were clearly good reasons for the various witnesses to have prepared statements previously, whether for the purposes of substantiating their complaints to the Ecuadorian authorities, for the purposes of making claims under the Colombian compensation scheme, or in the context of the *Arias v. Dyncorp* litigation before the US courts. Ecuador has produced no such earlier statements by the witnesses which

---

[414] *Case concerning Territorial and Maritime Dispute between Nicaragua and Honduras in the Caribbean Sea (Nicaragua* v. *Honduras)*, *ICJ Reports 2007*, p. 731, para. 244.

might corroborate the factual accounts and allegations now put forward by them. However, in fact, as detailed below, the questionnaires compiled by a number of the witnesses for the purposes of their claims in the *Dyncorp* proceedings, which have been obtained by Colombia, reveal significant discrepancies when compared to the statements they have sworn on behalf of Ecuador in the present proceedings.

3.78. Further, given the matters outlined above, there are clear grounds for concern based on the way in which the evidence of the witnesses has been taken, as well as due to the various vectors by which rumours and second-hand accounts of the spraying may have circulated in the border region.

3.79. But in the present case, the matter goes beyond merely treating the assertions of the witnesses with "caution". As will be shown, in the light of the actual contents of the statements and the various allegations made, that they are deserving of no credibility whatsoever. The statements are clearly and demonstrably false as regards a large number of the allegations made. The falsity of many of the allegations can be shown in a number of ways:

- First, insofar as certain of the witnesses allege that they were subjected to direct overspray, the spray flight data demonstrates unequivocally that their allegations cannot be true.
- Second, certain of the witnesses allege that the spraying resulted in the deaths of their children or

other relatives. As discussed below, it is clear from the scientific evidence, that the spray mixture is incapable of causing death. Ecuador no longer asserts the contrary,[415] although nevertheless, it continues to rely on the evidence of a number of witnesses who assert that their relatives died as the result of the spraying. Significantly, a number of the witnesses who make allegations of deaths being caused by the spraying are also those that assert direct overspray and whose evidence is demonstrably also false in that regard.

- Third, quite apart from the allegations of those witnesses who state that they saw planes emitting "white smoke" which, as discussed above, in relation to a number of the witnesses cannot possibly be true, the vast majority of the witnesses in any case allege having seen the spray planes engaged in spraying operations. However, the indications in many of the witness statements as to their locations show that they were in areas from which it is simply impossible, given the distances involved, that they could have directly observed with the naked eye any spraying operations occurring within Colombia, and this irrespective of the vague nature of their allegations as to the period in which they allege the spraying took place.

[415] See, ER, para. 2.4: "True, its effects on people might not necessarily be fatal…"

- Fourth, analysis of available satellite imagery conducted by Dr Evans on behalf of Colombia demonstrates that even in cases in which spraying took place close to the border, no effects are visible within Ecuadorian territory.[416] That evidence accords with the modeling of drift from the spray events by Dr Hewitt, which likewise demonstrates that even spray events relatively close to the border were incapable of resulting in a deposition rate of significant amounts of spray drift capable of causing the alleged damages. Indeed, the deposition values of the closest spray events, modeled under worst-case scenarios, only ranged between 0.001 and 1.66 g/ha, with only one event resulting in 2.71 g/ha.[417] As noted above, the level of concern for amphibians, the *most sensitive* animal species according to Ecuador, is 1,368 g/ha, whilst the level of concern for various crops ranges between 36 and 1,958 g/ha. Weller suggests a massively over-protective value of 4.1 g/h.

(2) ECUADOR'S APPROACH TO THE WITNESS EVIDENCE

3.80. Prior to turning to deal with the actual allegations made by the various witnesses, it is convenient to make a number of general observations in relation to Ecuador's approach to the witness evidence, and to deal with two of the specific matters

---

[416] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 1.1-1.5, 3.38, 3.51, 3.69 and 3.77.

[417] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results.

identified above which clearly undermine the credibility of the witness statements, namely the allegations made by a number of witnesses of direct overspray and the allegations that spraying resulted in deaths.

3.81. In particular, it is notable that Ecuador, in maintaining its reliance on the sworn declarations of the various witnesses, does not rely on the evidence of each witness in its entirety, but rather adopts what may charitably be characterised as a "pick and mix" approach, choosing those bits which best suit its case and which have not yet been shown to be unreliable. However, it is not permissible for it to cherry-pick in this way those allegations of the witnesses which support its case, whilst disregarding those allegations which inconveniently do not accord with other evidence, including, in particular, the spray data.

3.82. A critical feature of the witness statements, made at a point when the spray data were not available to Ecuador, is their deliberate vagueness as to the precise time and place of spray events. Subsequently, in the *Reply*, Ecuador has sought to match up news reports and other secondary evidence of spray events, with the spray data and claims in the witness statements. However, on close analysis it will be seen that there is little or no concordance between the various sources. Indeed, many allegations of residents of the border region are clearly falsified by the spray data.

3.83. Clearly, the statements of each of the witnesses (and the claims of other individuals reported in the other, supposedly

corroborating materials produced by NGOs, or in press reports) must be assessed in their entirety. In this regard, the allegations of the witnesses on which Ecuador does not choose to rely in its *Reply* are significant, and in a number of respects, demonstrably false.

3.84. The statements of the various witnesses filed with the *Memorial*, contain a catalogue of allegations, the most serious of which relate to instances of direct overspray of witnesses in Ecuadorian territory and allegations of death caused by exposure to the spray mixture.[418]

3.85. To the extent that those allegations are shown to be untrue, and to the extent that Ecuador no longer relies on them, the overall credibility of the individual witness is clearly undermined.

(a) Allegations of direct overspray

3.86. A number of the Ecuadorian witnesses make express allegations that planes sprayed directly over the communities.

3.87. Two of those witnesses reside in Salinas. Witness 4 states:

> "In the year two thousand and one, I remember having seen two planes followed by helicopters which passed by slowly, several times in the same day, above our community, dropping something like a mist. I was working the farm and I would see them

[418] These were detailed in CCM, paras. 7.124-7.148.

> crossing the San Miguel River and going from one side of the border to other."[419]

Similarly, Witness 5, the evidence of whom has already been touched upon above, claims that in 2001,

> "I saw three white planes protected by helicopters flying over Salinas. The planes left behind a white cloud of smoke that had a sour chemical-like odor. […] The planes did not respect our airspace. They entered our territory as they were spraying to turn around toward Colombia"[420]

3.88. However, as noted above, as the spray flight data demonstrates, at no point did any spray events take place over Salinas, whether in the period claimed or at all. In 2001 the distance from the closest spray event to the first alternative location for Salinas was, 4,481 metres, and to the second alternative location, 3,050 metres.[421]

3.89. Thus the allegations of Witnesses 4 and 5 as to spraying over Salinas are clearly untrue.

3.90. Witness 5 is also a plaintiff in the *Dyncorp* proceedings; the differences which result from the questionnaire completed by him for the purposes of those proceedings, in comparison to his statement in the present proceedings, are striking. For instance, in contrast to the allegation in his statement in these proceedings of spraying in 2001, the questionnaire in the *Dyncorp* proceedings clearly alleges that the first incident of

---

419 EM, Vol. IV, Annex 192.
420 EM, Vol. IV, Annex 193.
421 See above para. 3.72.

spraying was in 2000. Further, although in these proceedings, Witness 5 alleges overflight of Ecuadorian territory and direct overspray, the questionnaire in the *Dyncorp* proceedings makes no such allegation; rather, in response to questions as to when, how and from whom the witness was aware of the spraying program, he responds that "THEY FUMIGATED ON THE *OTHER SIDE OF THE FONTIER* [sic] IN THE YEAR 2000"; and states that he learnt of the spraying from "THE NEIGHBORS AND THE NEWS THAT THERE WAS THE MILITARY FUMIGATING THE FRONTIER IN THE YEAR 2000".[422]

3.91. Likewise Witness 11, resident in San Francisco II, alleges direct overflight, and indeed that she was oversprayed. She states that

> "At the beginning of the year two thousand and one, I remember that some planes came by spraying. I was working on the farm, which is near the San Miguel River. The planes were above me. There were two planes and a few helicopters that turned around over the river. I saw a liquid come out of the planes and it began to drip when they went by."[423]

3.92. There is reason to doubt Witness 11's statement that her farm is "near" to the San Miguel River. In fact the settlement of San Francisco II is located over two kilometres from the San Miguel River, which forms the border between Ecuador and Colombia. Further, Witness 11 is another of those witnesses

---

[422] CR, Vol. VI, Annex 67: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 193, Witness 5) (Emphasis added).

[423] EM, Vol. IV, Annex 199.

who are also plaintiffs in the *Dyncorp* litigation. Her questionnaire submitted for the purposes of those proceedings indicates that her farm is approximately 2 km from the River, and she states at various points within the questionnaire that when she was allegedly sprayed she was "2 kilometres or 2000 meters" from the border between Ecuador and Colombia (i.e. the river).[424] In addition, the location of the farm as being some 2 km from the River is confirmed by her sister, Witness 12, who, it appears, resides on the same farm.[425] Strikingly, Witness 12 makes no allegation of direct overspray or overflight.

3.93. The two closest spraying events to San Francisco II in early 2001 (and indeed in the entire year) occurred in late January 2001, and were, in any case, about 1 km north of the closest point on the River, and nearly 4 km north of San Francisco II itself.[426] Put shortly, Witness 11's allegation of direct overspray cannot be true.

3.94. Witness 13, who states that he lives in La Cóndor, asserts that his farm is located "two or three kilometers from the border with Colombia." He goes on to allege, in terms which parallel the assertions of Witness 11, that

---

[424] CR, Vol. VI, Annex 69: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 199, Witness 11).

[425] CR, Vol. VI, Annex 70: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 200, Witness 12).

[426] Distance of the two closest spray lines to San Francisco II location: 3,860 metres and 4,880 metres; and distance to the Ecuadorian bank on the border river: 955 metres, and 1500 metres (CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 76-77, Fig. 8; see also CR, Vol. I, Appendix, pp. 84-85, Fig. 8).

> "In the year 2002, two or three planes protected by helicopters sprayed over our community. The planes flew over the San Miguel River, and as they turned to go back, they passed over Ecuadorian territory. I could see a white liquid that the planes were dropping."[427]

3.95. So far as Colombia has been able to ascertain, La Cóndor is situated about 1.9 km south of San Francisco II, and therefore substantially more than 4 km from the border river. However this may be, in any case, Witness 13's allegations are in any case on their face incredible. Although his evidence is admittedly not free from ambiguity, it appears from his statement that he asserts that there was direct spraying over La Cóndor.

3.96. To the extent that he does make allegations of direct overspraying, or failing that, of overflight, any such allegations are shown to be false by the spray data. Although there was some spraying within the adjacent Colombian territory in the region during the course of September 2002, no spray events took place within Ecuadorian territory, and certainly not as far from the border as La Cóndor. Further, the distance between the two closest spray lines to the location of La Cóndor was 4,944 metres and 4,935 metres, nearly five kilometres.[428] Even, accepting the assertion of the witness as to his location at the time he allegedly observed spraying during 2002, he must have

---

[427] EM, Vol. IV, Annex 201.

[428] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 78-79, Fig. 9; see also CR, Vol. I, Appendix, pp. 98-99, Fig. 9.

been over 2.5 kilometres from the nearest spray event.[429] On any view, Witness 13's allegation that there was direct overspray is unsustainable.

3.97. Finally, Witness 8, a resident of Corazón Orense, claims in her statement made in 2009, that "it was about six or seven years ago when I first saw the planes *spraying over our community"* and that "we were able to see the planes flying over the Ecuadorian side".[430] However, that claim is once again clearly false: in 2001, the distances of the two closest spray lines to Corazón Orense location were 6,200 metres and 6,085 metres, and the distances of the spray lines to the Ecuadorian bank on the border river were 1,850 metres and 1,130 metres, respectively. In 2002, the closest spray lines occurred 5,125 metres, 4,810 metres, and 4,640 metres from Corazón Orense. Similarly, in 2003, the closest spray lines were even further away, being 12,360 metres, and 10,830 metres distant from Corazón Orense.[431]

(b) Allegations of deaths caused by exposure to drift

3.98. As to the allegations of deaths caused by spraying, in its *Reply*, Ecuador has retreated even further from the allegations made in the witness evidence than the cautious position taken in the *Memorial*. In its *Memorial*, Ecuador relied on a number of

---

[429] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 78-79, Fig. 9; see also CR, Vol. I, Appendix, pp. 98-99, Fig. 9.

[430] EM, Vol. IV, Annex 196, p. 2 (emphasis added).

[431] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 68-73, Fig. 4-6; see also CR, Vol. I, Appendix, pp. 60-63, Fig. 4-6.

reports containing allegations that the spraying was the cause of deaths of individuals, in particular young children, present in its territory,[432] although the relevant section relating to the alleged breach of human rights, argued only that "[p]ollution from Colombian spraying of toxic herbicides poses a well-documented *risk to life* and human health",[433] without expressly alleging that it caused death.[434]

3.99. By contrast, in the *Reply*, in the face of the evidence put forward by Colombia in its *Counter-Memorial*, Ecuador has essentially entirely dropped any allegation that the spray mixture is capable of causing deaths: it expressly admits that "its effects on people might not *necessarily* be fatal".[435] In the section on human rights, there is no allegation of breach of the right to life as such, as a result of any alleged causing of deaths.

3.100. However, Ecuador cannot escape the fact that a number of its own witnesses allege that the spraying directly caused the death of individuals, nor from the similar allegations contained in the various documents put forward as supposedly corroborating those accounts. A witness statement does not become partly reliable just because the party tendering it refrains from relying on allegations in it which are, or have been shown to be patently untrue!

---

432 EM, para. 6.50.
433 EM, para. 9.48 (emphasis added).
434 CCM, para. 9.61.
435 ER, para. 2.4 (emphasis added).

3.101. For instance, Witness No. 11, a resident of San Francisco II, alleges that as the result of spraying she lost two infant daughters. As regards the death of her first daughter, she alleges that both she and her daughter were directly oversprayed, and continues that her daughter subsequently became sick and died on 25 September 2001.[436] As for the second occasion, she alleges that during a further period of spraying in 2003, her two-month-old daughter died, and implies that the spraying was the cause:

> "When the planes returned, the diseases returned. Two years later, during a period of spraying, my two-month-old daughter died. She was born fat and pretty, and before the sprayings she never had any problems. But after the sprayings, she became sick with the same thing that my other daughter had, and that many children of my neighbors had every time the plane came -- vomiting, diarrhea and fever. I had no money as to go to the doctor, and she died on ten September, two thousand and three."[437]

3.102. As Colombia showed in the *Counter-Memorial* and as Ecuador now, apparently, accepts, the scientific evidence is unanimous in showing that the components of the spray mixture, in particular in the quantities in which they are contained in the spray mixture, are incapable of causing death in humans even as a result of direct overspray, and *a fortiori* as a result of drift.

3.103. Quite apart from the scientific evidence, there is reason to cast doubt upon the assertion of Witness 11 both that she and her first daughter were directly sprayed, and that her first

---

436 EM, Vol. IV, Annex 199.

437 *Ibid.*

daughter died as a result. In her statement, Witness 11 claims that her first baby was directly oversprayed while with her in the fields, and continues that "after the sprayings my three-month-old baby became sick […] She stopped drinking my breast milk and died on twenty-five September, two thousand and one". That statement is one of the few contained in the witness statements which allows identification of a specific period.

3.104. However, that statement, simply cannot be true, even taking at face value the witness' allegation that her farm is "close" to the river (which as discussed above, is open to serious doubt).

3.105. Although there was spraying north of the border in Colombian territory in January and the first few days of February 2001 and again in December 2001 (the closest spray event, as noted above, occurring in late January 2001),[438] the distances of even the two closest spray lines from San Francisco II were, respectively, 3,860 metres and 4,880 metres.

3.106. There was no spraying at all in the immediate border region in the area of San Francisco II during the 7 months preceding 25 September 2001. Given that Witness 11's baby is alleged to have been sprayed and subsequently to have died, when she was three months old, there was no occasion after her birth when she could have been sprayed, as alleged by her mother.

---

438 See above para. 3.93.

3.107. However, the falsity of the claims of Witness 11 does not stop there. The date of 25 September 2001 for the death of her daughter is inconsistent with the information previously provided by Witness 11 in her questionnaire in the *Dyncorp* proceedings. In that questionnaire, her first daughter is alleged to have died on 25 *June* 2001, having been born on 17 March 2001.[439] Those dates of birth and death are repeated in a questionnaire filed for the purposes of a claim in the *Dyncorp* proceedings by Witness 11 on behalf of her deceased daughter.[440]

3.108. However, given the location and timing of the spraying in Colombia in the area close to San Francisco II, which, as noted above, concluded in late January 2001, not only was there clearly no overspray of Witness 11 and her daughter, as alleged by Witness 11 in these proceedings, nor was there even any spraying in Colombia at any relevant time following the alternative date for the birth of her daughter which might have resulted in drift or which could have caused the harm alleged. All of Witness 11's allegations as to the death of her first daughter as a result of spraying are clearly false.

3.109. As to the death of her second daughter, the questionnaire filed by Witness 11 in the *Dyncorp* litigation at least accords with her witness statement in the present proceedings, both as to

---

[439] CR, Vol. VI, Annex 69: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 199, Witness 11).

[440] Included in: CR, Vol. VI, Annex 69: Plaintiff Questionnaires, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 199, Witness 11) personally and on behalf of her deceased daughter.

the date of birth, 30 June 2003, and as to the date of death, 10 September 2003.[441] However, Witness 11's allegation that the death occurred "during a period of spraying" is once again falsified by the spray flight data.

3.110. The spray flight data shows that there was no spraying at all during either August or September 2003 in the region of Colombia adjacent to the location of San Francisco II.

3.111. The closest spray event during July 2003 was some 7.5 km to the north of San Francisco II, and some 5 km from the nearest point on the Ecuadorian bank of the border river.[442]

3.112. As such, the allegations of Witness 11 as to the deaths of her daughters, both in her witness statement in these proceedings and in her questionnaire in the *Dyncorp* proceedings (to the extent that they are inconsistent) are not credible.

3.113. There is a further, striking aspect of the available evidence, which casts still further doubt upon the allegations contained in the evidence of Witness 11. Witness 11 and Witness 12 are sisters. This results clearly both from the match between their surnames, and from the names of their parents recorded on their identity cards annexed to the unredacted statements filed in these proceedings. The relationship is

---

441 CR, Vol. VI, Annex 69: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 199, Witness 11).

442 CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 80-81, Fig. 10; see also CR, Vol. I, Appendix, pp. 86-87, Fig. 10.

confirmed by their respective questionnaires filed in the *Dyncorp* litigation, which also show both gave the same address in San Francisco II.[443]

3.114. However, the evidence of the two sisters simply does not accord. Witness 12 alleges spraying in 2002 and 2004, rather than spraying in 2001 and 2003 as asserted by Witness 11.

3.115. Further, it is particularly striking that Witness 12 makes no mention of the death of her nieces in her statement in these proceedings. The closest she comes is her statement of her recollection that "at least four babies in my community died", although she is entirely unspecific as to the period in which this is alleged to have occurred. She goes on to state "They did not even last a week after the sprayings. They died within days of each other".[444]

3.116. Clearly, if Witness 11 believed that the death of her two daughters was caused by the spraying, one would have expected that Witness 12, her sister, resident in the same community (and apparently at the same address), would have made mention of those deaths.

3.117. Other witnesses likewise make allegations that deaths were caused by spraying. These claims are demonstrably equally false. Witness No. 14, also resident in San Francisco II, alleges

---

443 CR, Vol. VI, Annex 69: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 199, Witness 11). CR, Vol. VI, Annex 70: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp*, D.D.C. (EM, Vol. IV, Annex 200, Witness 12).

444 EM, Vol. IV, Annex 200.

that his wife was pregnant during a period of spraying and that his son, born in late July 2001, subsequently died. He states:

> "The first time the planes came from Colombia, I saw them fly over the San Miguel River. […] At that time, my wife was pregnant. […] My son who was born on thirty July of the year two thousand and one only lived forty-five days before dying."[445]

Similar considerations apply as regards this allegation as apply to the similar allegations of Witness 11; although there was some spraying in Colombia in early 2001 due north of San Francisco II, the closest spray event was more than 3.5 km away,[446] and the spraying in the immediate region across the border from San Francisco II stopped at the end of January 2001. Put shortly, the spraying in early 2001 could not have been the cause of the death in mid-September 2001 of the son of Witness 14. Further, as noted above, there was in any case undoubtedly no overspraying of San Francisco II.

3.118. Finally, Witness 6, a resident of Salinas, seems to imply that the death of her husband was caused by the spraying. She claims that

> "the first time that I saw the planes spraying by the river, the planes came, flying over the trees. My husband, my children and I would watch them from the house near the river. We saw that something like ashes was coming from the planes; it crossed the river and was getting close to where we were. […] The effect on my husband was the most extreme of the family. He had been working, bent down over

---

445 EM, Vol. IV, Annex 202.

446 See above para. 3.93, fn. 426.

> the coffee crops on our farm, when the smoke came and he saw a fine rain fall on the coffee leaves. He had on a thin, short-sleeved with shirt and long pants. The bumps appeared mostly on my husband's back, his skin peeled and he bled a lot. Since there was no road then we had to go to Lago Agrio by boat for treatment. He was taken to the clinic three times. Despite the visits to the doctors, he was never cured. The doctors treated him without knowing what he had, because they did not understand what it was, and he never got better; he could not go back to work. He died on the 16 June 2002."[447]

3.119. It has been shown that the spray mixture does not result in deaths, human or animal, even following direct overspray, so this claim is belied by that consideration alone. However, purely in the interest of showing the untruthfulness of the other elements of the allegations of Witness 6 set out above, the claim of Witness 6 has been analysed against the spray data.

3.120. Although Witness 6 is entirely unspecific as to the dates of the alleged spraying in question, given the date of death of her husband of 16 June 2002 and the close link which the witness draws with the spraying, it must be supposed that the spraying which allegedly caused his death must have taken place at some point during the first half of 2002. However, although there was spraying from August 2002 onwards in Colombia (albeit at a considerable distance to the north of the location of Salinas) and there was relatively light spraying during September 2002, due north of Salinas, there was no spraying during 2002 prior to August 2002. Further, the previous

[447] EM, Vol. IV, Annex 194.

spraying in the wider region of Putumayo was in January 2002 and took place over 10 km to the east. Going even further back, the spraying in November 2001 to the north of Salinas was again some considerable distance to the north. The only spraying prior to that date, whilst still at a considerable distance from the border and from Salinas, was that in January 2001, mentioned above in relation to the allegations of Witness 5.

3.121. Given the distances involved, none of the spraying operations could conceivably have resulted in the events that Witness 6 recounts, in particular her allegations that "the planes came, flying over the trees", nor can there be any basis for her allegation that she saw the planes releasing spray mixture.

3.122. Moreover, as is apparent from the identity cards annexed to the unredacted witness statements, Witnesses 1, 4 and 7 are the children of Witness 6. It is, to say the least, surprising, given the evidence of their mother, that they make no mention of the death of their father, and that they do not attribute that death to the spraying. In fact, in their statements none of them make any reference at all to the health problems that their father suffered.[448]

3.123. All of the allegations of Witness 6 that: she observed spraying, that her husband was exposed to the spray mixture, and that he subsequently died as a result, are clearly untrue.

[448] Statements of Witnesses 1, 4 and 7: EM, Vol. IV, Annexes 189, 192 and 195, respectively.

(3) THE SPRAY DATA FALSIFIES THE ALLEGATIONS OF THE WITNESSES

3.124. The present section responds to Ecuador's treatment of the evidence, in particular the witness evidence, in Chapter 4 of its *Reply*, and its assertion that the spray data substantially supports and corroborates the allegations of the witnesses as to the date and location of the spraying which they say that they observed.

3.125. As already noted, a fundamental problem in responding to the allegations of the witnesses as to spraying is that out of the statements of the 38 Ecuadorian witnesses, only one (Witness 11) expressly refers to a more or less precise period ("early 2001") in which spraying allegedly took place. But even Witness 11 is studiously vague, giving no more precise than "the beginning of 2001".

3.126. Some greater precision as to dates of alleged spraying can also be derived from the reference by Witness 11 to the dates of death of her two daughters, and Witness 14 to the death of his son. However, as discussed above, none of these allegations withstands scrutiny when compared to the actual dates and locations of spraying within Colombia.[449]

3.127. The rest of the witnesses are studiously vague in their references to the dates of spraying. Fifteen of the statements

[449] Furthermore, the claim of Witness 14 in the *Dyncorp* litigation was dismissed for failure to fill out a questionnaire, behaviour which is inexplicable if his story was true. See CR, Vol. VI, Annex 62: Document 148, Dyncorp Case No. 1:07CV01042(RWR), United States District Court for the District of Columbia, 18 Sep. 2009.

only mention a year, without reference to a particular month or season.[450] Twenty statements do not mention any particular year or merely make vague references to a period of "seven or eight years" prior to the making of the statement.[451]

3.128. Ecuador seeks to play down and to justify the lack of any precision on the basis that "it is an attribute of memory that exact dates become harder to recall as more time passes", and that this is particularly true for the "minimally educated subsistence farmers" or indigenous persons of the border regions.[452]

3.129. Colombia does not suggest that Ecuador's witnesses should have kept "day-planners" which they then "file […] away for posterity".[453] However, given the importance and serious nature of the alleged damages, including in some cases, allegations of deaths, it is surprising that the allegations made should be so imprecise and diffuse, not just as a matter of days, or even months, but also as to the year in which sprayings are alleged to have occurred.

3.130. Ecuador argues in particular that the area within 10 kilometres of San Francisco II "was sprayed during at least 5 different months between 2001 and 2002, with repeated

---

[450] Witnesses 4, 5, 12, 13, 20, 30, 32, 33, 34, 36, 37, 38, 39, 40 and 41 (EM, Vol. IV, Annexes 192, 193, 200, 201, 206, 214, 216, 217, 218, 219, 220, 221, 222, 223 and 224).

[451] Statements of Maria Blanca Chancosa Sánchez, and Witnesses 2, 3, 6, 7, 8, 9, 10, 14, 17, 18, 19, 21, 22, 23, 26, 27, 28, 29 and 31 (EM, Vol. IV, Annexes 187, 190, 191, 194, 195, 196, 197, 198, 202, 203, 204, 205, 207, 208, 209, 210, 211 and 212).

[452] ER, para. 3.40.

[453] *Ibid.*

sprayings in the subsequent years". In its view, "with so many intervening spray events, it is not surprising that a witness did not give the precise month when the first such event occurred."[454] But this is disingenuous.

3.131. As noted above,[455] none of the spray events between 2001 and 2002 were closer than 3 km from the village, and the majority were much further away. Ecuador's point might have some force if what was at issue were multiple and repeated instances of direct *overspray* of particular villages. However, this did not occur, and there were *no* such incidents of overspray, let alone on multiple occasions. Rather, given the distance from the villages at which the closest spray events occurred and the scientific evidence as to the lack of any appreciable spray drift at such distances,[456] the most the villagers of San Francisco II might have been aware of was the distant sound of Colombian planes and helicopters flying within Colombian airspace.

3.132. In this context, prior to turning to deal with Ecuador's reliance on the evidence of the witnesses as to the specific periods during which it is alleged that harm was suffered, it is worth putting the various allegations of the witnesses that they observed spray planes into context. Putting to one side the clearly untrue allegations of direct overspray made by a number of the witnesses, the great majority of the remaining witnesses

---

454 ER, para. 3.41.

455 See above, paras. 3.93, 3.105, 3.106.

456 CR, Vol. II, Annexes 1: Hewitt Report - Response to Giles (2011); 2: Hewitt Spray Events Modeling (2011); 3: Solomon Report (2011).

nevertheless allege that they were able to see the spray planes conducting the spray operations and to observe the actual spraying.

3.133. As to these witnesses, as set out in the Appendix, analysis of the spray data as compared to the claimed locations of the various witnesses shows that, in many cases, the distances of the nearest spray events in Colombia from the closest point on the Ecuadorian bank of the border river in the region of the communities at which the witnesses allege they lived were up to 12,360 metres. In order to help visualise the distances involved, it may assist to refer the Court to the distance to some familiar landmarks in the immediate vicinity of the Peace Palace:

- The distance from the flower-bed in front of the main gates of the Peace Palace to the seafront at Scheveningen, proceeding in a straight line north-west along Scheveningenseweg, is almost exactly 3 km as the crow flies.
- Similarly the straight-line distance from the gates of the Peace Palace along Scheveningenseweg to the junction with Johann de Wittlaan and Professor BM Teldersweg, just in front of the Crowne Plaza Hotel, is some 1.2 km.

3.134. As will be shown, when the allegations of the witnesses are compared with the spray data, what the Court is being asked to believe in relation to the accounts of many of the witnesses is that individuals standing outside the gates of the Peace Palace

could have observed in some detail aircraft flying at low altitudes at these distances, or even further away. In relation to spray events which took place at more than 1.2 km distant, this is implausible; for events more than 3 km distant, it is simply incredible. At distances greater than 3 km, it simply beggars belief. Even if there were no vegetation such as would be liable to obscure lines of sight, at such distances, there is no way in which the witnesses could have seen the aircraft sufficiently well so as to provide the detailed descriptions they give.

3.135. Moreover, as has already been noted, in contrast to The Hague, the terrain in much of the relevant sectors of the border region, including in the area of Putumayo immediately north of Salinas and San Francisco II, is characterised by undulating, gently rolling hills. Further, and in any case, as is clear from the satellite imagery analysed in the report of Dr Evans, there is substantial vegetation in the relevant areas of the border "of significant height"[457] and the areas of coca crops sprayed by Colombia are generally clearings surrounded by forest. The evidence of Ecuador's own experts is that canopy in the region typically rises as high as at least 30 to 35m, with some emergent trees rising as high as 50 or even 65m above ground level.[458] All of these factors mean that it is implausible that individuals in Ecuador could have observed the spray planes engaged in spraying operations, at relatively low altitudes, unless they were spraying relatively close to the border.

---

[457] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 4.9.

[458] ER, Vol. II, Annex 4, pp. 18, 25.

3.136. Ecuador alleges that the level of detail provided by the witnesses is sufficient, on the basis that the allegations as to the time of the spraying of the various witnesses "coincide" with the spray data acquired from the United States.[459]

3.137. However, on the contrary, even on the basis of the very vague timeframes involved, it is clear from the spray flight data that the alleged instances of exposure to spray mixture did not in fact take place as alleged by the witnesses.

3.138. Ecuador purports to rely on a number of distinct time periods, namely

- Sucumbíos in 2001 (although the period covered in fact encompasses December 2000 to February 2001);[460]
- Sucumbíos in 2002, including as regards the Kichwa and Cofán communities;[461]
- Esmeraldas in 2000;[462]
- Esmeraldas in 2007, including as regards the Awá (although the period covered by the relevant section of Ecuador's *Reply* includes discussion of alleged incidents in 2004 and 2005).[463]

---

459 ER, para. 3.36.
460 ER, paras. 3.9-3.46.
461 ER, paras. 3.47-3.83.
462 ER, paras. 3.84- 3.97.
463 ER, paras. 3.98- 3.114.

In what follows, each of these periods will be dealt with in turn, examining in detail and comparing the concrete evidence contained in the spray data as to where spraying in fact occurred with the allegations of the witnesses relied upon by Ecuador, as well as the other evidence which supposedly corroborates the allegations of the witnesses.

3.139. In that regard, it is to be noted that Ecuador's criteria for identifying a match or coincidence between the allegations of the witnesses and the spray data appear to be exceptionally elastic. As to the location of the spray events, Ecuador refers to Figures 2.13 and 2.14 and suggests that "all the places the witnesses identified are located in very close proximity to the areas where the recently-acquired flight data confirm that spraying were being conducted".[464] But the illustrations in question show the locations of spraying over the *entire* period 2000-2008 within 10 km of the border. It is entirely unsurprising that the locations specified by the witnesses should be in the general area within Ecuadorian territory in which one or more spray events took place in adjacent Colombian territory over such a long period. However, any such supposed "coincidence" between the locations alleged by the witnesses and the actual location of spraying, as recorded in the spray data, over a period of some eight years, proves nothing at all.

3.140. In fact, when the spray data is analysed in detail (rather than in the broad-brush manner utilized by Ecuador), instead of supporting their allegations, it shows that the vast majority of

[464] ER, para. 3.38.

the witnesses allege spraying in places at which no spraying was ever sufficiently close to have been observed by them, still less to have produced the effects alleged. The same mismatch is true in relation to the majority of the contemporaneous evidence, including reports in the media and reports by NGOs, which Ecuador relies upon as corroborating the allegations of the witnesses.

3.141. In order to respond to Ecuador's allegations of correspondence between the allegations of the witnesses, Colombia has carried out an analysis of the closest spray lines to the locations in the years in which the witnesses allege that spraying took place. This is included as an appendix to the present *Rejoinder*. Rather than referring to the allegations of each of the witnesses individually within the body of the present *Rejoinder*, Colombia refers the Court to the appendix, and its analysis of the distance of the closest spray lines to the alleged locations of each of the witnesses for the years as to which their allegations appear to relate. As Colombia has noted, a large number of witnesses are entirely vague as to the precise period in which they allege spraying took place. In particular a number of the witnesses merely refer to the fact that spraying took place "seven or eight" years prior to the date of their witness statements.[465] Ecuador suggests that "[s]ince the statements were sworn in the first month of 2009, seven or eight years before is 2001 or 2002". But in light of the indications that the statements were prepared in advance of the date that they were

[465] See e.g. the statements of Witnesses 2, 3, 9 and 11: EM, Vol. IV, Annexes 190, 191, 197 and 199, respectively.

actually sworn, it is equally plausible that the witnesses may have been referring to 2000. Accordingly, where appropriate, Colombia has analysed the allegations of the witnesses as against the spray events relating to each of 2000, 2001 and 2002.

3.142. From the analysis, it is apparent that, in a large number of cases, either there was no spraying at all during the period alleged, or, insofar as there was some spraying, it was at considerable distances from the location at which the witnesses allege that they witnessed or suffered the effects of spraying.

3.143. In relation to those cases where there was some spraying in the immediate vicinity, corresponding to the broad time periods alleged by the witnesses, Dr Hewitt's modeling of the closest spray events shows that the quantity of spray mixture deposited at the closest point within Ecuadorian territory was in all cases nearly zero and therefore insignificant.[466]

(a) Sucumbíos December 2000-February 2001

3.144. In attempting to make out its case as to damage caused by spraying in Sucumbíos during "the very end of 2000 and early 2001", Ecuador refers to the depiction of spray flights in Figure 3.1 of the *Reply*, and, relying on the Hansman & Mena report, asserts that there were "at least 3,276 spray flights within 10 kilometres of Ecuador in December 2000 and 8,228 more in January 2001".[467]

---

[466] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results.

[467] ER, para. 3.9.

3.145. To begin with, the relevance of the 10 km band arbitrarily selected by Ecuador has already been rebutted. As discussed in Chapter 2, only spray events in Colombian territory in the immediate vicinity of the border abutting the locations of the witnesses would be relevant. But, in any event, as is clear from Figure 3.1 of the *Reply*, a large proportion of the spray flights conducted during December 2000 were located close to the northern extent of the 10 km band.

3.146. Further, the figures which Ecuador invokes are entirely misleading; when regard is had to the Hansman & Mena report,[468] it becomes clear that the totals given are those for all events within 10 km of the entirety of the border of the province of Sucumbíos. For instance, as regards December 2000 the total includes a very substantial number of events located some 100 km to the east, to the northwest of Puerto Ospina, adjacent to an entirely separate sector of the border as to which there is no allegation by Ecuador (and no evidence is put forward) that any damage was caused. The same is true of the total number of spray events given January 2001, although the number of events in the area adjacent to the eastern part of the border of Sucumbíos was somewhat smaller.

(i) Ecuador's reliance on the witness evidence

3.147. Quite apart from these distortions in Ecuador's *Reply*, in relation to the alleged harm in Sucumbíos in 2001, Ecuador relies in particular upon the statements of Witnesses 4 and 5,

[468] ER, Vol. II, Annex 1, Appendix 3, p. 29.

both residents of Salinas.[469] However, both witnesses are entirely vague as to the period in 2001 during which they allege that the spraying to which they refer took place; Ecuador's invocation of their evidence as supporting its allegations of damage being suffered in Salinas in either late 2000 or early 2001, as opposed to any other period within 2001, is entirely opportunistic and speculative.

3.148. In addition, the evidence of both witnesses is demonstrably untrue insofar as both make allegations of direct overspraying of Salinas. Although Ecuador glosses over these allegations, it is clear even from Ecuador's own map, based on the spray data (ER Fig. 3.1), that the actual spraying during the period December 2000 to February 2001 was at all points entirely within Colombia, and that the spraying took place some considerable distance from Salinas.

3.149. Although Ecuador suggests that Salinas is "a community less than 1 kilometre from the spraying", on Figure 3.1 Salinas is shown as located within the salmon-coloured band indicating a distance of 2-3 km from the closest spray line. This is confirmed by Colombia's own analysis of the spray data. As regards the spraying in Colombia in 2001, using the first alternative location for Salinas,[470] the distance from the closest spray line (flown on 4 January 2001) to the closest point on the Ecuadorian bank of the river was over 3 km, and the distance to

469 ER, paras. 3.11-3.12.
470 See above, para. 3.71.

the community itself was over 4.4 km.[471] Using the other alternative location, the closest spray event (flown on 5 January 2001) was at a distance of 2.7 km from the Ecuadorian bank of the river, whilst the distance to the alternative location of the community was over 3 km. As can be seen from the map contained as Figure 2 in the Appendix, in both cases, the spray events in question were relatively isolated, and the bulk of the spraying was in fact some considerably further distance away.

3.150. Further, these closest spray events were flown at heights of 70m and 79m respectively. Yet it is suggested that the witnesses could, across undulating, forested terrain, have seen aircraft flying at these heights, at a distance which is roughly equivalent to that from the gates of the Peace Palace to the sea-front at Scheveningen.

3.151. It is also clear that drift from the closest spray events is likely to have resulted in zero deposition within Ecuador, since the wind blows from Ecuador towards Colombia for most of the year,[472] meaning no drift towards Ecuador. However, even in the unlikely scenario that the wind was blowing towards Ecuador, drift from the closest spray events would have resulted in only minimal deposition within Ecuador. The drift from the two closest spray events in 2001 were modeled by Dr Hewitt, using an extremely conservative figure for the height of the

---

[471] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 64-65, Fig. 2; see also, CR, Vol. I, Appendix, pp. 36-37 and 42-43, Fig. 2.

[472] CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of the Nariño and Putumayo Border Zone with Ecuador*, Dec. 2011, Vol. II pp. 706-730.

vegetation, the actual height and altitude of the spray events, and a worst case scenario for meteorological conditions. Even on that basis, the predicted levels of deposition on the Ecuadorian bank of the border river from the closest events in 2001 as a result of that modeling are 0.106 g/ha and 0.167 g/ha respectively, orders of magnitude below the relevant levels of concern for either plants or the most sensitive wildlife.[473]

3.152. To put the matter beyond doubt, insofar as the witnesses might be mistaken as to the year, and in fact be referring to spraying in 2000, or even in 2002, similarly low values resulted from Dr Hewitt's modeling. Of the spray events in 2000, the two closest lines were identified at distances of just under 3.9 km, and a little over 2 km, from the Ecuadorian bank of the border river. The deposition values produced by the modeling were of 0.01 g/ha and 0.099 g/ha, respectively.[474] Similarly, in 2002, the two closest lines were at distances of 2.5 km, and over 1.7 km from the closest point on the Ecuadorian bank of the river, giving rise to deposition values of 0.11 g/ha and 0.015 g/ha, respectively.[475] Again, those deposition values are an order (or several orders) of magnitude below even the most conservative level of concern advanced by Ecuador, and even further below what Colombia maintains is an appropriate level of concern.

3.153. It bears emphasising that the level of deposition modeled by Dr Hewitt is the predicted deposition from the nearest spray

---

473 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.

474 *Ibid.*, rows 69, and 53.

475 *Ibid.*, rows 49, and 68 (NB Appendix: Witnesses 2 and 3).

lines at the *nearest* point of Ecuadorian territory, i.e. the Ecuadorian bank of the river. As Dr Hewitt notes, the probable deposition even further into Ecuador, at either of the locations used for Salinas, would have been even less. Similarly, as Dr Hewitt likewise observes, drift from other events located further within Colombia would also result in even lower levels of deposition.[476]

3.154. Ecuador relies on the testimony of a number of other witnesses, including Witnesses 3 (also a resident of Salinas) and Witness 18 (a resident of San Franciso I), in connection with the supposed psychological effects of the spraying in the context of its discussion of the July 2001 CONAIE Report.[477] Once again, neither witness is specific as to the dates of the spraying.

3.155. Witness 3 is one of the witnesses who merely refers to spraying "seven or eight years ago". To the extent that Witness 3 is to be taken to have been referring to spraying in 2001 or 2002 (which is far from clear), the above considerations in relation to Witnesses 4 and 5, also resident in Salinas, apply equally; the modeled levels of deposition from drift from the closest spray events are so low that it could not have caused any effects, even on Ecuador's overly cautious approach.

3.156. The evidence of Witness 18 is even vaguer as to the date of spraying. Further, although Ecuador later relies upon this witness in support of the proposition that "to a person,

---

[476] See CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), para. 8, p. 6.

[477] ER, para. 3.18.

Ecuador's witnesses specify exactly where they were when the sprayings took place", there are difficulties in locating exactly (or even approximately) where the witness allegedly was at the relevant time. Although she says that she lives in San Francisco I (at village located some 2 km from the border with Colombia, in close proximity to the San Francisco II community), she says that she was "about a kilometre" from the border river when she first observed the planes and spraying, and that her house is located "closer to the river". It would thus appear not to be located in the San Francisco I community at all.

3.157. On any view, her evidence is not credible. In 2000, the closest spray events, which were isolated, were over 1.8 km away from the closest point on the Ecuadorian bank of the border river in the region of San Francisco I. If the witness is to be taken to be alleging spraying in 2001, the closest spray events, again isolated, were 955 meters from the closest point on the border river. On her own evidence that she was approximately 1 km from the river, Witness 18 must have been at least 2 km distant from the closest spray events.

3.158. The satellite imagery analysed by Dr Evans demonstrates that there is substantial vegetation in this area,[478] which has the effect of substantially reducing any drift from spraying within Colombia. And there was no or virtually no drift.

[478] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 4.9.

3.159. Dr Hewitt modeled the deposition from each of the closest spray lines to San Francisco I in 2000, 2001 and 2002.

- As to 2000, the two closest lines gave rise to *de minimis* deposition levels at the Ecuadorian bank of the river of 0.01 g/ha and 0.01 g/ha.[479]

- As to 2001, the two closest lines, which were at distances of 955 meters and 1500 meters, respectively from the Ecuadorian bank on the border river, gave rise to the equally minuscule deposition levels of 0.033 g/ha and 0.1 g/ha.[480] Deposition further south of the river would have been even less.

- Even if it is assumed that the spraying to which Witness 18 refers is that which took place in 2002, (as to which see below), when there was some spraying closer to the border, rather than 2001, on her own evidence, Witness 18 must still have been at least 1.5 km distant from that spraying. Dr Hewitt's modeling of the closest spray lines for this year (which took place at altitudes of 45m and 43m respectively) shows that the amount of deposition at the Ecuadorian bank of the river (and not at San Francisco I) due

[479] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69, and 71.

[480] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 67, and 52 (NB: Appendix, Witness 11, pp. 84-85, Fig. 8).

to the closest event forming part of the 2002 spraying would not have been greater than 0.75 g/ha.[481] Again, this is still orders of magnitude below the predicted levels of concern for both plants and for the most sensitive wildlife.

3.160. In any case, the truthfulness of the evidence of Witness 18 is called into question by the questionnaire and other documents she filed in the *Dyncorp* proceedings, which casts doubt on a number of her statements:

- Although in her witness statement in the present proceedings, Witness 18 states that she has lived in San Francisco I for 25 years, the Questionnaire filed in the *Dyncorp* proceedings states that she lived in Chimborazo province until 2000.[482] Chimborazo is located to the south of Quito, and almost 200 km from the border with Colombia. Similarly, her identity card annexed to her unredacted statement in these proceedings indicates that her place of birth is San José de Chimbo, a town in Bolívar province, neighbouring Chimborazo province, and located approximately 170 km south-southwest of Quito.

---

[481] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16, and 30 (NB: Appendix, Witnesses 12 and 13).

[482] CR, Vol. VI, Annex 72: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM, Vol. IV, Annex 204, Witness 18).

- By contrast to the vague assertion as to the alleged date of spraying in her statement in these proceedings, the Questionnaire in the *Dyncorp* proceedings is more specific, and alleges spraying in 2002; moreover, it states that she was 2 km, rather than 1 km from the river;
- In her witness statement in these proceedings Witness 18 claims that she experienced immediate symptoms; by contrast, in the Questionnaire filed for the purposes of the *Dyncorp* proceedings, she claims that symptoms appeared after 1 month;
- In her witness statement in these proceedings, Witness 18 alleges damage to crops, including damage to her plantains "shortly after fumigations"; by contrast, in the Questionnaire in the *Dyncorp* proceedings, no claim was made in respect of crop damage, and she only mentioned non-crop plants dying after a period of 3 weeks;
- Finally, in these proceedings, Witness 18 claims that four cows died; by contrast in the Questionnaire in the *Dyncorp* proceedings, no claim was made in relation to damage to farm animals.

3.161. Ecuador refers only very briefly to the evidence of Witnesses 2, 3, 9 and 11 insofar as they are alleged to have

"specifically referred to sprayings beginning in 2001".[483] However, as is clear from Ecuador's reference to Witnesses 2, 3 and 9 in the footnote accompanying the subsequent strained argument that those witnesses who refer to spraying commencing "seven or eight years ago" must be taken to have been referring to *either* 2001 or 2002, and that those allegations should be taken to be sufficiently precise to place reliance on their evidence,[484] Witnesses 2, 3 and 9 did not "specifically refer to sprayings beginning in 2001". Rather, this is Ecuador's inference from their evidence.

3.162. In any case, as shown in the Appendix, even if the evidence of these witnesses is understood as alleging spraying in 2001, the deposition levels from the closest spray events are still tiny, and could not have caused the harms alleged.[485]

3.163. Strikingly, Ecuador does not expressly refer to the evidence of Witness 11 in Chapter 3 in relation to spraying in Sucumbíos in 2001 except for the bare proposition that she states that there was spraying in 2001.[486] This is despite the fact that she specifically alleges having experienced the effects of spraying in 2001, San Francisco is located relatively close to Salinas, being located some 6.4 km to the southeast, and the evidence of Witness 18 from the neighbouring village of San Francisco I is relied upon. By contrast, Ecuador does rely on

---

483 ER, para. 3.39.
484 ER, para. 3.41, fn. 481.
485 CR, Vol. I, Appendix, pp. 18-19, 28-29, 68-69 and 84-85; Fig. 2, 4, and 8.
486 ER, para. 3.39.

Witness 11's evidence in other contexts, in particular in relation to the alleged effects on human health (albeit notably not as regards the alleged deaths of her daughters).[487]

3.164. The reason Ecuador does not invoke her allegations as to spraying in 2001 is no doubt because her allegations as to the death of her first daughter allow the date of the alleged spraying to be fixed with more or less precision. As discussed above, the spray data in fact shows that there was no spraying in the vicinity (let alone direct overspray), at any possibly relevant time in 2001 between the dates of birth and death of her daughter.[488]

3.165. Finally, Ecuador devotes a separate sub-section to the evidence of the "Kichwa and Cofán of Sucumbíos".[489] Insofar as this section relies on harms allegedly suffered by Kichwa individuals resident in San Francisco II (including in particular Witness 12), it is essentially duplicative of the preceding part of the section. The evidence of Ms Blanca Chancosa, as with the July 2001 CONAIE report discussed below, is self-evidently based on hearsay, and what she was told by inhabitants, and not on any first-hand experience of the effects of spraying.

3.166. However, Ecuador also devotes a number of paragraphs to the alleged harm suffered by individuals resident in the Cofán-Bermejo reserve. It makes a number of serious accusations with regard to alleged harm to the Cofán indigenous

487 See, e.g. ER, para. 7.11; fn. 1268 and fn. 1270.
488 See above para. 3.106.
489 ER, para. 3.72-3.83.

community and makes sweeping and tendentious generalisations based on the spray data figures.[490] However, as set out in the Appendix, in all relevant years, the sprayings were conducted at distances and under conditions that, according to the scientific evidence, would have resulted in zero or insignificant deposit. Therefore, the damages alleged by Ecuador, which do not even occur under direct overspray[491] could not have taken place.

3.167. Using the same tactics employed elsewhere in its *Reply*, Ecuador vastly overstates the number of relevant spray events flown in the region of the Cofán-Bermejo Reserve, including all of those found in an exorbitant area within Colombian territory. It claims that "[i]n 2002, there were more than 8,950 spray flights within 10 kilometres of the Reserve", and that between 2000 and 2008 there were more than 12,400 spray flights within 10 kilometres of the Reserve, and more than one thousand within just 2 kilometres."[492] However, spray events at such distances are irrelevant.

3.168. It should be stressed that, pursuant to Decree 1843 of 1991,[493] which is still in force, the protective strip provided for in Colombian law for aerial spraying of herbicides is 100 metres in the vicinity of human settlements, bodies of water and natural parks, and not 2 kilometres as Ecuador would have the Court

---

490 ER, paras. 2.173-2.176.

491 See above Chapter 2, Section B. The Spray Mixture, and paras. 3.349, 3.367 and 3.378 below; CR Vol. V, Annexes 56 A-C. See also, CCM, paras. 7.75, 7.79, 7.149, 7.161 and 9.142; Vol. II, Annexes 116 (CICAD I) and 131 A-I (CICAD II).

492 ER, para. 3.81.

493 CCM, Vol. II, Annex 30.

believe.[494] Following a Technical Opinion of September 2003, in the EMP for the Program, established by Resolution No. 1054 of 2003, the Ministry for the Environment expressly referred to the 100-metre protective strip established by the decree for aerial spraying in the vicinity of protected areas.[495]

3.169. Ecuador does not indicate the precise location of the communities in which the Cofán witnesses (Witnesses 26, 27, 29 and 31) live or lived at the relevant times, and Colombia has been unable to ascertain the precise location of those settlements from other sources, However, the relevant witnesses all claim that the communities in which they reside are located within the Cofán-Bermejo indigenous reserve. Further:

- They all state that they reside or resided next to the San Miguel River;
- Most belong to the Avié community or state they live in its vicinity;
- Witness 29 adds that his family has lived on the mountain;
- Witness 29 states that he attended school in the neighbouring Colombian location of Santa Rosa de los Cofanes;

494 ER, para. 2.171.

495 CR, Vol. IV, Annex 34: Ministry for the Environment, Technical Opinion N° 1059, 24 Sep. 2003. See also, CCM, Annex 50 (Resolution N° 1054 of 30 Sep. 2003, EMP).

- Witness 31 states that his two-house, nine-person community is located an hour-and-a-half's walking distance from the Colombian location of San José;
- as results from the identity cards annexed to their unredacted witness statements, Witness 29 is the son of Witnesses 26 and 27, and, given his age, it is to be presumed that he lived with his parents at the relevant time.

3.170. The area that corresponds to all of these facts is the north-eastern part of the Cofán-Bermejo reserve on the banks of the San Miguel river abutting the border with Colombia. That area is the same as that for which lines are depicted in the vicinity of the Cofán reserve, in Figure 2.11 in the *Reply*.

3.171. However, comparison with the spray data shows that the allegations of the witnesses cannot be true. There was no spraying anywhere sufficiently close to the northern border of the Cofán-Bermejo reserve in each of 2000, 2001, 2003, 2005 and 2006. As for the years 2002, 2004 and 2007:

- in 2002, there was spraying to the north of the river; however, the closest spray line in the area of the reserve in which the witnesses appear to have resided was nevertheless more than 393m from the closest point on the Ecuadorian river bank;
- similarly, in 2004, although there was again spraying north of the river, the closest line in the spraying near the relevant part of the border was

439m from the Ecuadorian bank of the river, whilst in the group of spraying further to the west, the spraying was more than 340m away from the bank;

- in 2007, the closest of the very small number of spray lines to the north of the reserve was 932m from the nearest point on the Ecuadorian bank of the river.

3.172. Dr Hewitt modeled the deposition rate for the closest spray line in 2002, the two closest spray lines in 2004 (from each of the two groups of spraying in the east and the west of this part of the border) and the closest spray line in 2007. The estimated deposition values were 0.700 g/ha, 0.506 g/ha, 0.0833 g/ha and 0.6199 g/ha,[496] respectively. Although Dr Hewitt used worst-case scenarios, the values are significantly below even the most conservative level of concern. In addition, as discussed below, Dr Hewitt conducted further modeling of the closest spray lines in the western part of the border for 2002, with similar results.

3.173. Further evidence of the lack of any significant drift of spray mixture into Ecuadorian territory is provided by the satellite image analysis conducted by Dr Evans. Usable satellite imagery was available covering the period immediately before and after the closest spraying in 2002. Dr Evans analysed that data and reached the conclusion that:

[496] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 18, 28, 54, and 23.

> "While significant changes in vegetation cover and condition may be observed in the Republic of Colombia in late 2002 near the Cofán-Bermejo Ecological Reserve – some of which changes are clearly due to the PECIG spraying that took place in Colombia during August, September and October of 2002 – there are no similar changes reflected on the Ecuadorian side in the area encompassed by the Cofán-Bermejo Ecological Reserve."[497]

In reaching that conclusion, Dr Evans conducted a close review of the entire visible boundary of the reserve and, with one exception, found no signs of any ill-effects on vegetation within Ecuadorian territory.[498]

3.174. The sole exception identified by Dr Evans related to a small plot of land in the western part of the area to the north of the border of the reserve (away from the area of the reserve in which Witnesses 26, 27, 29 and 31 are presumed to have lived), which had changed from vegetated to unvegetated in the time between the two available satellite images, during which time there had been spraying in the immediate vicinity across the river in Colombia. In relation to that specific plot, Dr Hewitt was requested to model the projected deposition rates for all relevant spray lines in the vicinity. The output of the modeling was as follows:

- Row 22: line sprayed on 22 September 2002. Distance to the Ecuadorian bank on the border river: 169 m. Deposit: 0.633 g/ha;

---

[497] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 1.3.

[498] *Ibid.*, para. 3.47.

- Row 47: line sprayed on 22 September 2002. Distance to the Ecuadorian bank on the border river: 123 m. Deposit: 0.137 g/ha;
- Row 57: line sprayed on 22 September 2002. Distance to the Ecuadorian bank on the border river: 117 m. Deposit: 0.0673 g/ha;
- Row 21: line sprayed on 22 September 2002. Distance to the Ecuadorian bank on the border river: 86 m. Deposit: 0.637 g/ha.[499]

3.175. Even adding together all of the lines, the total projected deposition is well below the relevant levels of concern, including the over-protective level of concern identified by Weller of 4.1 g/ha.[500] As such, the change in vegetation of the plot in question could not have been caused by the spraying, but must have been as a result of some other cause.

(ii) Ecuador's reliance on additional evidence

3.176. In seeking to bolster this extremely weak evidence that spraying in 2001 caused effects in Sucumbíos, Ecuador attempts to rely on what it suggests are corroborative contemporaneous reports of NGOs and press reports.

3.177. Ecuador suggests that Colombia "says next to nothing about the early NGO reports" in its *Counter-Memorial*.[501] If

[499] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 22, 47, 57, and 21.
[500] ER, Vol. II, Annex 3, p. 14.
[501] ER, para. 3.27.

there is anything to be added to supplement what Colombia said in the *Counter-Memorial*,[502] Colombia is happy to do so here.

3.178. The first and general point is that those reports are no more reliable than the witness statements. They do not directly document the harm suffered in the relevant areas, but are based on interviews with local residents, collected some time after the alleged events.

3.179. As regards the June 2001 report by *Acción Ecológica*,[503] the extravagant allegations of the border residents as to the effects of the spraying, on which the drafters of the report based their conclusions, lack any scientific basis. As shown in Chapter 2, and discussed further below, the spray mixture does not cause the effects alleged and this further highlights the implausibility of the report's assertions, since it mentions the considerable distances at which the alleged effects are said to have occurred. Indeed, it refers to people located 5 or 6 kilometres from the alleged location of the spraying as reporting "the death of 25 calves and 9 cows that miscarried during the sprayings", and to others, located between 8 and 10 kilometres away, as having reported "the death of 7 cows from a total 11".[504] This is scientifically impossible.

3.180. Moreover, those allegations are on their face clearly unreliable when compared with the actual dates and locations of spraying in the relevant period. In particular, in a passage not

---

502 Cf. CCM, paras. 1.29-1.30, 7.123, 7.142, 7.151, 7.162-7.163, 7.182.
503 EM, Vol. IV, Annex 161.
504 *Ibid.*, p. 10.

included by Ecuador in the extracts provided in the annexes to its *Memorial*,[505] the report states:

> "Campesinos in the border region have claimed that the fumigations were carried out by various airplanes in groups of four to six, accompanied by helicopters. During February and March the fumigations were carried out between 7h00 and 12h00 in the morning and from 14h00 to 17h00 in the afternoon, during three consecutive days (Cooperativa Nuevo Mundo). Others claimed the fumigations were daily from 8h00 to 16h00, from December to February and there were some nights that they sprayed during a shootout. The fumigations were repeated after a period of one week to fifteen days (Organización San Francisco)."[506]

3.181. A number of points may be made as to the allegations of the local residents.

- First, as demonstrated in Chapter 2, spraying only ever took place during daylight hours, and there was never any spraying during the night anywhere in that area.[507] The allegations of the residents of San Francisco in this regard are false.
- Second, although San Francisco II and Nuevo Mundo are situated only a relatively short distance (some 3 km) apart, the allegations are clearly inconsistent as between themselves both as to the

---

505 EM, Vol. IV, Annex 161.

506 CR, Vol. VI, Annex 63: *Acción Ecológica*, *Report on the Investigation of the Fumigations' Impacts on the Ecuadorian Border* (June 2001), p. 3 (Page not included either in EM, Vol. IV, Annex 161, or in the original of the annexes).

507 See paras. 2.240-2.256.

times of the spraying, and as to the periods during which it took place.

- Third, the allegations of the inhabitants of Nuevo Mundo of spraying in February and March 2001 (and of the inhabitants of San Francisco of spraying in February 2001) are also inconsistent with the dates of actual spraying, as recorded in the spray data. Spraying in the region concluded on 28 January 2001, with the closest instances of spraying due north of the communities taking place on 27 January 2001 at a minimum distance of nearly four kilometres from San Francisco II, and between 1 and 1.5 km from the Ecuadorian bank on the border river.[508] In February, sprayings were conducted east of that area, more than 9 km away.

3.182. Given those inaccuracies, the report's conclusion, relied upon by Ecuador as to the existence of "a direct temporal relation between the fumigations and the appearance of the sicknesses"[509] cannot be relied upon.

3.183. Ecuador likewise relies on the CONAIE *et al.* report from July 2001, and in particular the "section summarizing the testimonies of the local populations" which Ecuador suggests "in all material respects parallels the witness statements Ecuador

---

[508] See above para. 3.93, fn. 426.

[509] ER, para. 3.16, referring to EM, para. 3.15 which quotes EM, Vol. IV, Annex 161, p. 11.

submitted with the *Memorial*".[510] Despite this supposed parallelism between the CONAIE report and the declarations of the witnesses, Ecuador is rather coy in its references to the report, and simply refers the Court to it.[511]

3.184. On closer inspection, the reason for Ecuador's restraint becomes clear. The simple fact is that the allegations in the report are entirely inconsistent with the spray data.

3.185. The report recounts, on the basis of testimony of members of the San Francisco II community, that

> "The death of four children was reported during the period of heaviest sprayings: one from El Cóndor Community and three from the Reina del Cisne Community, including a 1-year-old. They stated that in the past two years, no child under the age of three had died, which can be proven since the cemetery for the neighboring communities is located in San Francisco 2; however, in the period from 2-10 January 2001, these four children died."[512]

3.186. Quite apart from the fact that the consensus of scientific evidence is that even direct overspray of the spray mixture, let alone exposure due to drift, is incapable of causing death, examination of the spray events in late December 2000 and early January 2001 shows that the spraying which took place simply could not have been the cause of the deaths reported.

3.187. The village of Reina del Cisne is located roughly 4.5 km south-west of the villages of San Francisco I and II and some

---

510 ER, para. 3.16.
511 *Ibid*.
512 EM, Vol. IV, Annex 162, p. 13.

6 km south of Salinas. The spray data shows that the closest spray event during the relevant period was some 8 km away, an event which occurred in late January 2001, after the alleged deaths took place, rather than late December 2000 or early January 2001. Other events were even further away. The closest spray events during December 2000 were likewise over 8 km away, with the majority of the spray events in that period being even further to the north.

3.188. The Cooperativa La Cóndor, is located roughly 2 km almost due south of San Francisco II and some 4 km to the east of Reina del Cisne. Although the closest spray event during the relevant period was somewhat closer compared to Reina del Cisne, being some 5.8 km away, it again took place in late January 2001, after the alleged death took place. The closest spray event in December 2000 was over 8.8 km away. Again the majority of other events in that month took place even further to the north.

3.189. Even on Ecuador's own case as to spray drift, which assumes perfectly flat, nude terrain, and fails to take account of the barrier effect of any trees,[513] it is inconceivable that any significant quantity of the spray mixture could have drifted as far as Reina del Cisne or La Cóndor, and this no matter how many spray runs took place.

[513] ER, Vol. II, Annex 1, p. 10.

3.190. The report also quotes a Mr Jorge Salas from the Cooperative Chone I;[514] as shown on Figure 3.1 in Ecuador's *Reply*, Chone I is located to the east, some 40 km away from San Francisco 2 and some 5.3 km south of the San Miguel River. It is far removed from any of the areas in Colombia where any spraying was carried out prior to the date of the report in July 2001. The allegations of Mr Salas add nothing to Ecuador's case.

3.191. Accordingly, although there do indeed exist "parallels" between the sworn declarations of the Ecuadorian witnesses and the CONAIE report, the most evident "parallels" are the inaccuracy of the allegations in both as to the time and place of spraying when compared with the actual spray data.

3.192. Ecuador also makes reference to a number of press reports of the supposed effects of the spraying. For instance, in relation to Sucumbíos in 2001, it refers to a report dated 10 July 2001 as to the supposed effects of the spraying in the communities of 10 de Agosto, located to the south-east of San Francisco I and II and La Cóndor, approximately 1.7 km from the San Miguel river; and La Charapa, a community located some 6 km southeast of the San Miguel river (although the newspaper report suggests it is 3 km from the river), to the east of 10 de Agosto.[515] The press article states that the residents of

514 EM, Vol. IV, Annex 162, p. 11.
515 ER, para. 3.21.

10 de Agosto claimed that fumigations had taken place some three to four months previously (i.e. in March or April 2001).[516]

3.193. However, the sprayings in Colombia within two kilometres of the border in this area of the border region ended in late January 2001 and did not recommence until November 2001. There was only one spray event in Colombian territory, far to the east of where San Francisco and La Cóndor are located, at a distance of over 16 km from the communities and 10 km to the Ecuadorian river bank in the vicinity of those communities. Given the location of the communities of La Charapa and 10 de Agosto, even on Ecuador's erroneous modeling of drift, there is simply no way in which spraying some 16 km to the north could have resulted in deposit of spray mixture. The allegations in the press reports relied upon by Ecuador are as unreliable as the evidence of the witnesses and the NGO Reports.

3.194. In summary, the witness evidence, as well as the supposedly corroborative evidence relied upon by Ecuador as to the alleged harms in Sucumbíos in 2001, is simply inconsistent with the evidence, notably the spray data. It disproves, rather than proving, Ecuador's case.

(iii) Satellite imagery

3.195. Finally, the analysis of satellite imagery provides additional strong countervailing evidence that spraying within Colombia in 2001 did not result in any deposition of significant

[516] ER, Vol. IV, Annex 61.

amounts of spray mixture within Ecuador and that there was no damage to plants within Ecuadorian territory in the areas alleged by the witnesses in the region of Salinas.

3.196. As set out in the expert report of Dr Evans (Annex 6), available satellite imagery shows clearly that the spraying in December 2000 and January 2001 caused no discernible effects whatsoever within Ecuador. Dr Evans analysed available images captured by satellites showing the area of Ecuador and Colombia in the region of Salinas before, during and after the relevant period of spraying in order to see whether any changes in vegetation were perceivable in Ecuadorian territory. By contrast to the situation as regards Colombian territory, as to which the images showed clear changes in vegetation which parallel closely the actual dates and locations of spraying within Colombia, Dr Evans found that there were no changes to the vegetation within Ecuador which appeared to have been caused by spray drift from spraying in Colombia:

> "While significant changes in vegetation cover and condition may be observed in the Republic of Colombia in late 2000 and early 2001 near Salinas – some of which changes coincide very closely with locations and times associated with PECIG spraying that took place in Colombia during that time period according to available spray data – there are no similar changes reflected on the Ecuadorian side in the vicinity of Salinas. Those relatively minor changes in vegetation condition that did occur are believed to be entirely consistent with normal

cultivation activities such as clearing, planting and harvesting."[517]

(b) Sucumbíos November 2001 to October 2002 (including as regards the Kichwa and Cofán communities)

3.197. Although Section I.B Chapter 2 of Ecuador's *Reply* is entitled "Sucumbíos 2002", it covers the period from November 2001 to October 2002. Similar defects to those present in relation to Sucumbíos in 2001 are apparent in relation to the evidence of the witnesses on which Ecuador relies in an attempt to substantiate its allegations of drift and damage in Sucumbíos in this period.

3.198. Once again, Ecuador provides figures for the total number of spray events during the relevant period (although misleadingly, given that multiple spray events may take place within a single mission, it refers to them as "spray flights"). Ecuador claims that between December 2001 and January 2002, there were 10,487 spray events within 10 km of the border, and that between August and October 2002, there were an additional 28,121 spray events. [518]

3.199. As with the similar assertion made in relation to the total number of spray events in Putumayo in the period between late 2000 and early 2001, the vast majority of these events took place at some remove from the border. Further, as is clear from

[517] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Ph.D., Dec. 2011, para. 1.5.
[518] ER, para. 3.49.

the Hansman & Mena report,[519] the total figures presented encompass events which took place within a distance of 10 km of the entirety of the Putumayo-Sucumbíos border, including spray events which occurred in areas of the border as to which Ecuador has not put forward any claim or evidence of damage.

3.200. Ecuador suggests that "[t]ellingly, what the flight data shows is described in the witness statements, which were submitted to the Court long before the flight data became available to Ecuador".[520] Despite the vagueness of the witnesses as to the periods during which they allege that they witnessed spraying and claim that they suffered damage, and the length of the period which Ecuador has chosen to compare with those claims, once again, careful examination of the spray data reveals that the allegations of the witnesses and the claims made in the supporting documents are in fact substantially refuted by the spray data, and the various allegations are without foundation.

(i) Witness evidence

3.201. As to the alleged harms in Sucumbíos in late 2001 and 2002, Ecuador relies principally on the evidence of Witness 20, a resident of Puerto Escondido, who alleges that in 2002 he saw planes, and was in the path of a cloud of drifting spray mixture.

3.202. Witness 20 is entirely unspecific as to the date, or even the month in 2002 in which he alleges that he was exposed to spray drift. However, the spray data shows that his claims are

519 ER, Vol. II Annex 1, pp. 11-13.
520 ER, para. 3.50.

clearly untrue. Even from Figure 3.3 in Ecuador's *Reply*, it is apparent that the closest spray event during the period November 2001 to October 2002 was at some considerable distance from Puerto Escondido. Analysis of the spray data shows that the closest spray events to Puerto Escondido, all of which occurred on 10 October 2002, were all more than 2.5 km from the Ecuadorian bank of the boundary river at Puerto Escondido. These three closest spray events took place at heights of 43m, 48m and 42m respectively.

3.203. Once again, as shown by the satellite imagery analysed by Dr Evans, there is substantial vegetation in this area of the border, including along the banks on both sides of the river, as well as in the unsprayed area bounded by the loop in the river, separating Puerto Escondido from the closest spray lines.[521] Given the vegetation and the height at which the planes were spraying, at such a distance, it is incredible that Witness 20 could have seen the planes such as to provide the detailed description contained in his witness statement.

3.204. Nor is it credible that he could have been affected by heavy drift in the manner alleged. At Colombia's request, Dr Hewitt modeled the deposition rates at the closest point on the river bank in Ecuadorian territory from each of the three closest spray events. The deposition values produced by the modeling were 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[522] Once

[521] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 4.9.

[522] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13, and 50.

again, all of these levels of deposition are *de minimis*, and well below any level of concern postulated.

3.205. Ecuador does not discuss in detail the evidence of the other witnesses who allege spraying in 2002, merely referring the Court to the list in a footnote, which refers to the evidence of Witnesses 2, 3, 4 (Salinas); Witness 9 (Corazon Orense); Witnesses 12, 13, and 17 (San Francisco II); Witnesses 22 and 23 (also Puerto Escondido); and Witnesses 40 and 41 (Awá reservation). However, upon analysis, the allegations of none of those witnesses accords with the spray data.

3.206. As regards Witnesses 22 and 23, resident in Puerto Escondido, similar considerations apply as regards the evidence of Witness 20, also from Puerto Escondido. Neither is specific as to the precise date of the spraying, and although there was some spraying to the north of the village in October 2002, that spraying was nevertheless in Colombian territory at a minimum distance of over 2.5 km from Puerto Escondido itself.[523] Neither witness could have observed the spray planes. Similarly, Witness 22's allegation of overflight of Ecuadorian territory is also unsubstantiated.

3.207. As to the reference by Ecuador to the evidence of Witnesses 40 and 41, Colombia assumes that is simply an error - the Awá reservation is located in the province of Carchi, near

[523] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, p. 70, Fig. 5; see also CR, Vol. I, Appendix, pp. 142-143 and 148-149, Fig. 5.

the border with Nariño, some 120 km to the west. It is not in Sucumbíos, and is not depicted on Ecuador's Figure 3.3.

3.208. In any event, the allegations of Witnesses 40 and 41, the two witnesses who had their undoubtedly pre-prepared statements notarised in Otavalo,[524] are not credible. Both state that they resided in Mataje Alto at the material time. However, there was only extremely limited spraying in this region during 2002, consisting of a handful of spray events, and the closest spray events were close to 1 km from the border, and well over 6 km from the location of Mataje Alto itself. The allegations of Witnesses 40 and 41, including their allegations as to overflight, are simply not credible.

3.209. In any case, the modeling of spray drift by Dr Hewitt of the closest spray lines in 2002 (at 970m and 1,430m from the Ecuador bank of the river, respectively), shows that, at most, only *de minimis* quantities (0.08 g/ha and 0.14 g/ha)[525] of spray mixture would have made it as far as the Ecuadorian bank of the river; even less could have been carried the additional distance in excess of 5 km to Mataje Alto itself.

3.210. Similarly, the evidence of Witnesses 2, 3 and 4 as to alleged spraying in Salinas is inherently unreliable. Witness 4 merely refers in general terms to spraying in "the next year" after the allegation of spraying in 2001. The numerous defects and inconsistencies as regards the allegations of Witness 4 as to

---

524 See above, para. 3.44.

525 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 55 and 46.

spraying in 2001 have been dealt with above.[526] In the light of those matters, the evidence of Witness 4 as to the effects of spraying also in 2002 is not credible.

3.211. As regards Witnesses 2 and 3, each is entirely unspecific not only as to the month of the spraying but even as to the year; each refers only to matters "seven or eight years ago". Ecuador puts forward no basis on which those allegations should be taken to refer to 2002, and indeed also relies on the evidence of these witnesses in support of its allegation of damage in 2001.[527]

3.212. But even Figure 3.3 in Ecuador's *Reply* shows that the closest spray event in 2002 was at least 3 km from Salinas itself. The more detailed analysis carried out by Colombia, taking account of the different possible locations for the village[528] shows that the closest spray event for the first alternative location of Salinas was over 1.7 km distant from the Ecuadorian bank and in excess of 2 km from the village itself. As regards the second alternative location, the closest spray event was 2.5 km away from the closest point on the Ecuadorian river bank, and 3.2 km from the village itself.[529]

3.213. Dr Hewitt has modeled the drift from the relevant spray events; his modeling shows minimal amounts of spray mixture

---

526 See above, paras. 3.87-3.89.

527 ER, para. 3.41.

528 See above, para. 3.71.

529 CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 66-67, Fig. 3; see also CR, Vol. I, Appendix, pp. 20-21, 30-31, Fig. 3.

(0.11 g/ha and .015 g/ha, respectively)[530] at the river bank, assuming worst-case conditions and that the wind was blowing from Colombia towards Ecuador, although in fact the opposite is the norm.[531] Even in that worst-case scenario, for the community located in excess of two kilometres further away, there would have been no or only minimal deposit. As such, again, the allegations of Witnesses 2, 3 and 4, including their allegations of overflight and having suffered the effects of spray drift, stand discredited.

3.214. This is even more true of Witness 9, a resident of Corazón Orense, and one of the witnesses who refers merely to spraying "seven or eight years ago". Ecuador treats this as conclusive that the alleged spraying took place in 2002, although it previously also relied upon the statement of Witness 9 as supporting the occurrence of spraying in 2001.[532]

3.215. However, as noted above, even if the allegations of Witness 9 relate to 2002, rather than 2001, the village of Corazón Orense, as is apparent from Figure 3.3 in Ecuador's *Reply*, is located a substantial distance from the river border, almost directly due south-east of Puerto Escondido. As is also apparent from Figure 3.3, the closest spray event during 2002 took place in Colombian territory at least 4 km from the village. Colombia's more detailed analysis shows that the closest spray

---

530 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, Table of Model Results, rows 49, and 68.

531 CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of the Nariño and Putumayo Border Zone with Ecuador*, Dec. 2011, pp. 706-730.

532 ER, para. 3.41.

events in fact took place at a distance of over 4.5 km from the village.

3.216. Witness 9's claim is that she was at her house when she witnessed the spraying, where her children were playing outside.[533] However, if that is so, given the location of Corazón Orense, her allegation that she saw planes "flying by the edge of the river" makes no sense.

3.217. Quite apart from this, Dr Hewitt's modeling of the nearest spray lines during 2002 resulted in a predicted deposition value at the Ecuadorian river bank of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha,[534] respectively for the three closest lines sprayed in 2002. This is well below even the excessively cautious value of 4.1 g/ha suggested by Weller (2011).[535]

3.218. Ecuador also relies on the testimony of Witnesses 12, 13, and 17, all supposedly resident in San Francisco II.[536] Witnesses 12 and 13, at least, clearly allege spraying in 2002, although Witness 17 merely alleges spraying "about six or seven years ago".

3.219. Further, although Witness 12 appears to be resident in San Francisco II itself, Witness 13 states that he is resident in La Cóndor, which, as depicted on Ecuador's Figure 3.3, is located

---

533 EM, Vol. IV, Annex 197.

534 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, Table of Model Results, rows 10, 13, and 50.

535 ER, Vol. II, Annex 3, pp. 14, 18, 20-21.

536 EM, Vol. IV, Annexes 200, 201 and 203.

some distance to the south of San Francisco II, and approximately 4.5 km from the border.

3.220. Witness 17 states that she is resident in La Carchi. Although the maps in Ecuador's *Reply* do not give a location for La Carchi, a search of Ecuadorian maps has revealed a village called Carchi, in the general area of San Francisco II, although that community is located some further distance to the south even than La Cóndor, and therefore a very substantial distance from the border. On that basis, Witness 17's allegation of overflight simply cannot be believed.

3.221. The analysis carried out by Colombia of the spray data shows that the nearest spray events in 2002 were over 3 km from San Francisco II itself, and nearly 5 km from La Cóndor.[537]

3.222. Colombia has already dealt with the allegations of Witness 13 as to overspray.[538] Given the distance of La Cóndor from the border it is simply not plausible that planes engaged in spraying operations within Colombia could have oversprayed the community; further, the spray data proves conclusively that they did not do so.

3.223. As to Witness 12, her Questionnaire in the *Dyncorp* proceedings states that her farm is located approximately 2 km

---

[537] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 78-79, Fig. 9. See also CR, Vol. I, Appendix, pp. 92-93, 98-99 and 110-111, Fig. 9.

[538] See above, paras. 3.94-3.96.

from the border.[539] However, the nearest spray events took place at a distance of approximately 500m from the nearest point on the Ecuadorian bank of the river, and on the basis of Witness 12's assertion in the *Dyncorp* proceedings, at the very least 2.5 km from her farm. As such, the allegations of Witness 12 that she saw planes spraying and that "the rain" fell over her,[540] are not credible.

3.224. In any case, the Questionnaire filed by Witness 12 in the *Dyncorp* proceedings further calls into question her testimony in these proceedings. Although in her statement in these proceedings, Witness 12 refers in general terms to spraying at an unspecified date in 2002, her Questionnaire in the *Dyncorp* proceedings refers to spraying in 2001 and 2002, and even specifically alleges "month of September, october, Tuesday, Friday 2001-2002" and later "25th September at 3.00pm".[541] As noted above, it is, to say the least, surprising that the witness should have been so specific for the purposes of the *Dyncorp* proceedings, yet so vague in her statement before this Court, made shortly thereafter.

3.225. Ecuador's unwillingness to engage fully with the evidence of the additional witnesses which it alleges also experienced the effects of spraying in 2002 speaks volumes. Upon analysis of their statements, none of them were

---

[539] CR, Vol. VI, Annex 70: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM, Vol. IV, Annex 200, Witness 12).

[540] EM, Vol. IV, Annex 200.

[541] CR, Vol. VI, Annex 70: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM, Vol. IV, Annex 200, Witness 12).

sufficiently close to any location in Colombian territory at which spraying in fact took place during 2002 to even have observed the flights themselves, let alone to have felt any effects from drift. Clearly, to the extent that they allege overspray, at locations well away from the river, their evidence is undoubtedly false. Their evidence as a whole should be disregarded as not credible.

(ii) The supposedly corroborating evidence

3.226. Ecuador shies away from dealing in any detail with the majority of the witnesses who allege that they observed or suffered the effects of spraying in 2002. Instead it relies heavily on other sources which it says substantially corroborate their (untrue) allegations. As demonstrated above, there is nothing to corroborate. The allegations of the witnesses do not stand up to scrutiny when compared with the spray data, and insofar as it is alleged that they suffered damage, in any case run counter to the scientific evidence showing the spray mixture causes no such effects.[542]

3.227. Moreover, analysis of the claims in the supposedly corroborative documents shows that they are equally flawed. Each of the documents relied upon by Ecuador, including press reports and reports compiled by NGOs, is based solely on the testimony of witnesses resident in Ecuadorian territory. Although Ecuador attempts to portray this material as objective

[542] See above, Chapter 2, Section B. The Spray Mixture.

evidence of the alleged effects of spraying, it is necessarily subject to exactly the same problems of lack of verifiability.

3.228. The claims of the individuals recorded in the secondary material at least have the virtue that most are more or less precisely dated. As such, it is possible to verify the dates of alleged damage against the dates of the actual spraying which took place within Colombian territory. When that analysis (which Ecuador failed to undertake) is performed, it is clear that the evidence is equally flawed, insofar as it does not accord with the dates and locations of spraying shown by the spray data.

3.229. Ecuador first refers to a number of press reports. Ecuador relies heavily on a report published in *El Universo* on 7 September 2002, which states that residents of the border region, including the town of Puerto Nuevo, had witnessed spray planes operating in Colombia during the previous week.[543] In fact the report is principally devoted to alleged harms which took place within Colombia; the allegations of observation of spraying by the inhabitants of the villages of La Punta and Puerto Nuevo, located within Ecuador, are the subject of a single paragraph at the end of the report. However, the spray data demonstrates that spraying during late-August 2002 was concentrated in a zone some 4 km to the north of the border in the region of Puerto Nuevo, and that during the first week of September 2002, immediately prior to publication of the report, the spraying remained a considerable distance from Puerto

543 ER, Vol. IV, Annex 68.

Nuevo – in fact the closest spray line prior to 7 September was 2 km away.

3.230. Similar considerations apply to the further report published in *El Universo* on 19 September 2002, relating to alleged harm caused in villages within Ecuador.[544] As Ecuador itself notes, the report refers principally to the testimony of Mr Ángel Encarnación of Chone II, who claimed that he had observed planes spraying within Colombia.[545] What Ecuador does not record is that Mr Encarnación alleged that the spraying took place "a few metres away from Ecuadorian soil", and that the report alleges that the populations most affected by fumigations were those of Chone Uno, Chone Dos, la Playera, Chanangué, Puerto Nuevo and Zozozranga.

3.231. Analysis of the spray data reveals that the allegations contained in the report cannot be true. Although there was some spraying to the north of the region in question during the course of September 2002, the closest spray event to Puerto Nuevo, which occurred on 6 September 2002, was 2.1 km away, whilst the closest event to Playera Oriental was at a distance of 2.14 km.

3.232. Further, the allegation of Mr Encarnación, the leader of Chone II, that he observed the spray planes "a few metres from Ecuadorian soil" is without substance. As shown on Figure 3.3 in Ecuador's *Reply*, Chone II is in fact located some

---

544 ER, Vol. IV, Annex 69.

545 ER, para. 3.56, referring to ER, Vol. IV, Annex 69.

considerable distance away from the river, to the south-east of Playera Oriental, and even on Figure 3.3 is shown as being approximately 3 km from the closest spray line (which occurred in October 2002, some distance to the south of those which occurred in September 2002). Chone I is located even further from the river, and is depicted on Figure 3.3 as being located over 7 km from the nearest spray line in October 2002.

3.233. Ecuador also makes reference to a report in *La Hora* dated 26 September 2002,[546] and suggests that it shows that "residents of the border villages including Santa Marianita, Monterrey, Puerto Mestanza and Puerto Nuevo, had watched as Colombian spray planes crossed over the border one week earlier."[547]

3.234. This is not what the news report actually says. The report recounts a single allegation of incursion of Colombian aircraft into Ecuadorian airspace, and of direct spraying over Ecuadorian territory during the previous weeks, made by Mr Victoriano Bravo Caicedo, the President of the "Campesinos Palmeras Fronterizas" association, which the spray data shows did not occur. The reference to the various villages mentioned is only made in the context of explaining the places of residence of the members of the association of which he is president. The report does not say that the residents of all the villages mentioned had observed violations of the border.

---

546 ER, Vol. IV, Annex 70.

547 ER, para. 3.58, referring to ER, Vol. IV, Annex 70.

3.235. Further, although the report does not make clear in which village Mr Bravo resides, the spray data shows that, wherever he resided, the allegations he made are not true.

3.236. As is clear from Figure 3.3 in Ecuador's *Reply*, the villages to which reference is made are relatively distant from each other. Santa Marianita is located over 5 km to the southwest of Puerto Mestanza, with Monterrey some 2 km to the east. Puerto Nuevo is even further away, being located more than 25 km to the east of Santa Marianita and approximately 23 km to the east of Puerto Mestanza.

3.237. Further, both Monterrey and Santa Marianita are located some considerable distance into Ecuadorian territory, away from the border. Santa Marianita is located approximately 2.5 km from the river, whilst Monterrey is approximately 2 km distant. If Mr Bravo had been in either of these settlements, his allegation would be incredible.

3.238. But even if he had been on the banks of the river, his allegation would lack foundation. Although there was spraying in the week or so prior to 26 September 2002 within the region of Colombia to the north of Monterrey and Santa Marianita, it was clustered to the northwest of Santa Marianita. The closest spray line was in excess of 4 km from Santa Marianita and, even further (approximately 7 km) from Monterrey. Further, the spraying in this period was approximately 9 km due east of Puerto Mestanza. Given the orientation of the spray lines, there is simply no plausible reason why the spray planes performing

the spraying operations would have found it necessary to go anywhere near Ecuadorian territory in the region of Monterrey or Santa Marianita, still less as far east as Puerto Mestanza, even when turning round between spray runs.

3.239. Further, even if Mr Bravo had been in Puerto Nuevo the spray data likewise falsifies his allegation. Although there had been some spraying in Colombia north of Puerto Nuevo up to early September 2002 (albeit at distances in excess of 2 km from Puerto Nuevo itself), after 10 September 2002, the focus of spraying shifted much further to the north, and there was no further spraying anywhere in the region of Puerto Nuevo until 3 October 2002.

3.240. It is convenient here also to refer to a number of other documents which refer to the alleged effects suffered in Monterrey and Santa Marianita.

3.241. For instance, the July 2003 Report of a "Verification Mission"[548] records the purported evidence of residents of Santa Marianita "located 2,500 metres from the San Miguel river" that Colombian planes "violate our airspace", of spraying in "July, August and September 2002",[549] and that three individuals had died as the result of spraying on 4 and 6 August 2002, and in September 2002.[550]

---

548 EM, Vol. IV, Annex 166.

549 EM, Vol. IV, Annex 166, p. 16 (pages of Annex 166 in EM, Vol. IV appear mislabelled as Annex 165 on top right).

550 *Ibid.*, pp. 11-12 (pages of Annex 166 in EM, Vol. IV appear mislabelled as Annex 165 on top right).

3.242. Aside from the obvious falsehood of attributing deaths to the spraying, which the scientific evidence shows is impossible, following the conclusion of spraying in January 2002, spraying within Colombia in the region of Santa Marianita did not recommence until August 2002; there was no spraying in July 2002. In any case, the initial spraying within the region of Colombia to the north of Santa Marianita at the start of August 2002 was far removed from the border area, and was in excess of 10 km from Santa Marianita itself. It could not possibly have been the cause of any effects in Santa Marianita let alone the deaths alleged.

3.243. The July 2003 "Verification Mission" also records the allegations of inhabitants of Monterrey of deaths in May and June 2003 (one of a 90-year old man), allegedly caused by spraying.[551] The attribution of the deaths to the spraying is simply fabricated, as shown by the scientific evidence explained in the *Counter-Memorial* and Chapter 2, above. Furthermore, there was no spraying during the year 2003 prior to May in the relevant region in Colombia, and the spraying during May and June 2003 was extremely limited, and all of it was in any case in excess of 5 km from the border, and at least 9 km from Monterrey.

3.244. Similarly, the report by a member of the Ecuadorian Congress, filed by Ecuador as Annex 167 to its *Memorial*, records the allegations of inhabitants of Santa Marianita of

[551] EM, Vol. IV, Annex 166, p. 12 (pages of Annex 166 in EM, Vol. IV appear mislabelled as Annex 165 on top right).

incursions into Ecuadorian airspace and direct overspray on 3 and 4 October 2002. These allegations are baseless; although there was some spraying on 3 October 2002, it was in excess of 2 km north of the river, and approximately 5 km north of Santa Marianita itself. There was at no time any spraying over Santa Marianita itself, set back as it is some 2.5 km from the river.

3.245. Ecuador also relies on the "medical inquests" of residents of Chone II, taken on 12 September 2002. These so-called "inquests" are actually pre-printed questionnaires distributed by an NGO, containing leading questions as to whether any health or other effects were suffered as the result of spraying. Although Ecuador asserts that "a group of doctors and medical students travelled to the border villages of Sucumbíos […] and documented the local residents resulting symptoms"[552] and later asserts that the "inquests" were prepared by "health professionals",[553] it is very far from clear that any medically-trained personnel took any part in the collection of the data, nor if they did so, that any proper individual medical examination worthy of the description took place. Indeed, from the format of the questionnaires, it appears that the questionnaires were compiled on the basis of brief interviews with the border residents, and that no attempts were made to verify the claims made as the various symptoms they alleged, nor as to the alleged dates of the spraying.

552 ER, para. 3.46.
553 ER, para. 7.13.

3.246. In any case, the questionnaires, although described as "Clinical toxicological sheets" only ask about the occurrence of certain symptoms, do not include any material from the clinical records of the respondents, and the symptoms listed can, as discussed further below, be caused by a variety of causes and clinical conditions.

3.247. Further, there is, at the very least, a selection bias insofar as they only show information of those purportedly affected without comparing it to health information from other residents in the areas that do not report similar symptoms. There is also a question of memory bias, since the questionnaires only ask about the listed symptoms, whilst also asking about details of alleged spraying.

3.248. The lack of complete medical records allowing for thorough examination of the medical background of allegedly affected individuals, as well as evidence of an integral –as opposed to a focused – medical diagnostic examination, curtails the possibility of associating an outcome with the alleged exposure situation, given that the symptoms may be caused by other health conditions unrelated to the alleged spraying. This is confirmed by studies conducted in Ecuador, in which those same symptoms are generally attributed to infectious diseases and parasites, highly prevalent in the border area[554] and to

[554] CR, Vol. VI, Annex 64: Organismo Andino de Salud, Hipolito Hunanue Agreement, *Analysis of Health Situation in the Border, Pacific/Andean Corridors Nariño/Tulcán - San Lorenzo (Colombia - Ecuador)*, 2009, pp. 46-47.

contamination caused by the logging, African Palm oil, and oil and mining industries in Ecuador.[555]

3.249. As such, despite the weight which Ecuador places on them, the questionnaires are of extremely limited value.

3.250. Quite apart from these issues relating to the lack of probative value of the "inquests" as to either the symptoms allegedly suffered, and any causal relationship with spraying, the allegations of the individuals who responded in the "inquest" questionnaires as to when and where they supposedly experienced the effects of spraying are, once again, falsified by the spray data.

3.251. Ecuador does not make clear that the "inquest" questionnaires relating to Chone II all claim that the relevant spraying to which they allegedly refer, supposedly occurred on 6 September 2002,[556] nor in that connection, that they contain a variety of allegations as to the distance from the individual at which the spraying took place, ranging from 500m to 3 km.[557]

---

[555] CR, Vol. VI, Annex 65: Pineda-Medina, Juan and Naizot, Anne-Lise/ FLACSO-Ecuador, Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño, pp. 195-220.

[556] ER, Vol. III, Annex 31.

[557] Inquest form of Isabel Campoverde, 12 September 2002, ER, Vol. III, Annex 31 (1 km); Inquest form of Alicia Calero, 12 September 2002, ER, Vol. III, Annex 31 (3 km); Inquest form of María Ilbay, 12 September 2002, ER, Vol. III, Annex 31 (1 km); Inquest form of Obdulia Pineda, 12 September 2002, ER, Vol. III, Annex 31 (1 km); Inquest form of Rosa Margarita Jiménez, 12 September 2002, ER, Vol. III, Annex 31)(500m to 1 km); Inquest form of Ma Encarnación, 12 September 2002, ER, Vol. III, Annex 31 (2 km).

3.252. In fact, although there were a handful of very short spray events which took place on 6 September 2002, almost due north of Chone II, the closest was over 4 km away from the village. As such, the allegations of all of the residents of Chone II are implausible, to say the least, including the claims that spraying at 3 km was witnessed.

3.253. Ecuador only refers briefly and selectively to the other "inquest" questionnaires contained in Annex 31 to its *Reply*, in the context of its discussion of the health effects allegedly suffered by residents, supposedly as a result of spraying.[558]

3.254. However, those forms contain the following allegations of spraying, the vast majority of which (with the exception of those made by residents of General Farfán, taken on 13 November 2002) were likewise collected on 12 September 2002:

- by residents of General Farfán: allegations of spraying in "September" 2002 at a distance of 1 km;[559] and "towards the end of September" 2002, at a distance of 600m;[560]
- by residents of Puerto Nuevo, allegations of spraying at distances of 700m[561] and 400m[562] on

[558] ER, paras. 3.61-3.63.
[559] Inquest form of Beatriz Esperanza Urbina, 13 November 2002, ER, Vol. III, Annex 31.
[560] Inquest form of Italo Ramón Bene Cosa, 13 November 2002, ER, Vol. III, Annex 31.
[561] Inquest form of Zacarías García Chavez, 12 September 2002, ER, Vol. III, Annex 31.

17 August 2002; spraying "directly above and at 700m" on an unspecified date;[563] spraying at a distance of 400m on 7 September 2002;[564] and an allegation of spraying a month previously (i.e. in mid-August) at a distance of 200m;[565]

- by residents of Playera Oriental, allegations of spraying "2-7 September and Friday 6 September" at a distance of 200m;[566] spraying on 6 September at distances variously of 200m,[567] 2-3 km,[568] 400m,[569] and 1-2 km;[570] and
- by a resident of Palma Seca, an allegation of spraying on "6 September and all of the prior week" at a distance of 200m.[571]

3.255. When compared to the actual spraying in the area, none of these additional allegations are worthy of any credit.

---

562 Inquest form of José Hilberto Reyer Ramirez, 12 September 2002, ER, Vol. III, Annex 31.
563 Inquest form of Edith Garcia, 12 September 2002, ER, Vol. III, Annex 31.
564 Inquest form of José Felix Guerga Rodríguez, 12 September 2002, ER, Vol. III, Annex 31.
565 Inquest form of Lucelia Torres García, 12 September 2002 ER, Vol. III, Annex 31.
566 Inquest form of Sabina Encarnación, 12 September 2002, ER, Vol. III, Annex 31.
567 Inquest form of Santa Angelina Calero, 12 September 2002, ER, Vol. III, Annex 31.
568 Inquest form of Lucía Calero, 12 September 2002, ER, Vol. III, Annex 31.
569 Inquest form of Rosa Elvira Mañay, 12 September 2002, ER, Vol. III, Annex 31.
570 Inquest form of Carmen Pineda, 12 September 2002, ER, Vol. III, Annex 31.
571 Inquest form of Benilde Pineda, 12 September 2002, ER, Vol. III, Annex 31.

3.256. As regards the allegations made by residents of General Farfán, the closest such spraying at any time during September 2002 occurred almost 2 km away from the village.

3.257. As regards the allegations of the residents of Puerto Nuevo,

- there was at no time any overspray of Puerto Nuevo itself;
- although there was some spraying in the period 10-20 August 2002, all of the spraying was located more than 7 km north of Puerto Nuevo; and
- spraying during the period between 1 and 10 September 2002 was located in areas of Colombian territory more than 2 km north of Puerto Nuevo.

3.258. As regards the allegations of the residents of Playera Oriental, spraying took place within Colombian territory at a distance in excess of 2 km. As with the allegations of the residents of Chone II, their allegations are clearly false.

3.259. Most strikingly, as regards the allegations of the resident of Palma Seca, spraying in the period 1-10 September 2002 to the northwest was in excess of 8 km, away, and the closest spray line of those to the north was over 6 km away.

3.260. In this regard, Ecuador's suggestion that both Palma Seca and Playera Oriental are located "close to the 2002 sprayings as disclosed in the recently-obtained spray flight

data"[572] is without any foundation. In none of these cases was any of the spraying sufficiently close that it could possibly have been observed by the witnesses. Their allegations, including as to the distance at which spraying supposedly occurred, are unsubstantiated. In short, the accounts of all of the individuals who compiled medical "inquest" forms are not worthy of belief.

3.261. The distance of the spray lines from Chone II and Playera Oriental also falsifies the suggestion, relied upon by Ecuador,[573] contained in the October 2002, *Acción Ecológica, et al.* report that the "evident damage from the fumigation of September 6, 2002" [574] supposedly seen in Chone II and Playera Oriental could have been caused by spraying within Colombia. That that allegation is shown to be untrue is not surprising; although Ecuador attempts to portray the *Acción Ecológica, et al.* report as providing "further corroboration" of the harm supposedly suffered in Ecuador, it in fact appears to be based on the very same "medical inquests", which, as is apparent on their face, were conducted by representatives of *Acción Ecológica*. As such, the report provides no independent corroboration but rather merely relies upon and perpetuates the allegations made by the persons questioned for the purposes of compiling the "inquest" forms.

---

572 ER, para. 3.63.

573 ER, para. 3.64, referring to ER, Vol. III, Annex 32.

574 ER, Vol. III, Annex 32; Ecuador, in filing extracts from that report with the *Memorial* (EM, Vol. IV, Annex 165) omitted to translate, or to annex the Spanish original of these sections.

3.262. The individuals resident in Playera Oriental and Chone II whose allegations (as made in the inquest forms) are reproduced in the report, all reside some considerable distance away from the river bank. However, as noted above, the closest spray event to the Ecuadorian river bank was at 610m. Yet the distances from that point to Playera Oriental and Chone II are 0.5 km and 1 km, respectively (i.e. 1.1 km and 1.6 km from the spray event, respectively). Given the evidence of Dr Hewitt that the levels of deposit downwind "rapidly approach zero within a few hundred meters,"[575] even if the wind had been blowing from Colombia towards Ecuador at the relevant time, no quantity of spray mixture sufficient to cause damage could have reached the communities.

3.263. In similar fashion, insofar as the report relies on the unverified allegations of the other individuals in relation to whom medical "inquest" forms were compiled, and whose claims as to the date and/or distance from spraying are, as set out above, demonstrably false, all of the conclusions that the report seeks to draw on the basis of those claims are undermined.

3.264. As a consequence, Colombia stands by its position that the report is wholly unsubstantiated, both specifically as regards the allegation of widespread damage being suffered by the residents of Chone II and Playera Oriental as a result of spraying within Colombia on 6 September 2002, as well as more

[575] CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011)), para. 32, p. 14.

generally. In particular, insofar as the report suggests various instances of harm to human health, the scientific evidence shows that harm of this type does not occur; in particular, insofar as it is suggested that deaths were caused by the spraying, this is scientifically impossible, as Ecuador seems to accept.

3.265. Similarly, the report is likewise unsubstantiated insofar as it alleges that the spraying resulted in food shortages. The report is based on unverified allegations of spraying, which have been shown above to be, in the majority of cases, demonstrably false. Further, and in any case, the scientific evidence shows that very little, if any, spray mixture could have reached Ecuador, and certainly not in quantities which could have had the widespread effects on crops alleged, given the projected minimum levels of concern based on distribution of species sensitivity.

3.266. Ecuador places great store by the reports of the UN Special Rapporteur on the Right to Health, devoting over four pages to his "findings".[576] However, Ecuador has simply misunderstood Colombia's criticism of its reliance on his report. As Ecuador itself acknowledges,[577] the Special Rapporteur visited Ecuador in May 2007; however, no spraying had taken place in the region of the border with Ecuador since January 2007. As such, the Special Rapporteur could not have witnessed the effects of the spraying himself; his information as to the effects of the spraying in Ecuador can accordingly only have

[576] ER, paras. 3.65-3.70.
[577] ER, para. 3.66.

been based on the testimony of the inhabitants of the border regions.

3.267. There is no indication that the claims of the individuals who gave their accounts to the Special Rapporteur were subjected to critical examination, nor that any efforts were made to verify them. His conclusions can only be as good as the evidence on which they are based, and as such, the Special Rapporteur's "conclusions" are simply expressions of opinion, and cannot be treated as in any way conclusive, and certainly not as in any way comparable to a judicial finding of fact.

3.268. Further, although the Special Rapporteur records that he reviewed "the scientific evidence", it is difficult to understand what that evidence might have been; certainly, as discussed further below, none of the mainstream, widely-accepted literature on the effects of glyphosate suggests that it is capable of causing the extreme effects alleged by the witnesses (and none of it is cited by the Special Rapporteur).

3.269. In any event, in his preliminary note of 4 March 2007, the Special Rapporteur specifically made clear that he had not purported to carry out a scientific assessment: "[T]he mission did not take samples or conduct laboratory tests, because it was not a scientific mission." In the event the Special Rapporteur never did submit a concluded report on the issue.[578]

---

[578] As recalled in CCM, Vol. I, para. 7.118. According to the website of the Office of the High Commissioner for Human Rights, there has been no further report on this subject by the Special Rapporteurs. Paul Hunt was

3.270. As regards the alleged harm suffered by the Kichwa communities, in its *Reply* Ecuador relies in particular upon the fact that a report by the Ecuadorian Ministry of the Environment from July 2003 makes reference to allegations of the inhabitants of the settlement of Yana Amarum as to spraying in the period from July to September 2002.[579] In that regard, Ecuador refers to Figure 3.3 in its *Reply* and comments that "the sprayings in that year and in that location were quite intense and close to the Kichwa communities."[580]

3.271. However, Figure 3.3 depicts sprayings over the entirety of the period November 2001 to October 2002 within a 10- km wide area – which, as shown in Chapter 2, is completely irrelevant for purposes of drift.[581] Moreover, despite its assiduity otherwise in depicting the many small villages located in Ecuadorian territory in relation to which the inhabitants claimed that they suffered damage, Figure 3.3 does not indicate the location of Yana Amarum.

3.272. When the actual location of Yana Amarum is taken into consideration, and the allegations contained in the July 2003 report are compared to the spray data, it becomes clear why Ecuador chose not to indicate its location. In fact the spraying in the region of Yana Amarum during the period to which they

---

replaced by Anand Grover as from 1 August 2008 and the latter's reports do not deal with the matter of the sprayings.

579 ER, para. 3.76.

580 ER, para. 3.76.

581 See above, Chapter 2, Section C. The Issue of Drift.

make reference was neither "intense", nor was it "close", as Ecuador suggests.

3.273. Colombia understands Yana Amarum to be located on the banks of the river to the northeast of Chone II. As noted above, in 2002, spraying in the relevant region only started in August 2002. The suggestion of spraying in July 2002 is untrue.

3.274. Further, during August 2002, what spraying there was took place a considerable distance to the north of the settlement. Even the spraying during the latter half of September 2002 was at no point closer than 5 km to the settlement. As can be seen from Figure 3.4 in Ecuador's *Reply*, the spraying consisted of small concentrated areas in relation to specific locations within Colombian territory and was clearly not "intense". The closest spray line to Yana Amarum in fact took place on 3 October 2002, and was no closer than 2.7 km from the Ecuadorian side of the riverbank.[582] Dr Hewitt's modeling of that nearest spray line indicated that that event resulted in an estimated deposition value of 0.111 g/ha.[583]

3.275. Finally, Ecuador does not mention that the same report, in recording the visit on 24 July 2003 to Yana Amarum, refers to claims of the inhabitants that they had been sprayed the previous

[582] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 93-94, Fig. 19; see also CR, Vol. I, Appendix, pp. 174-175, Fig. 19.

[583] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 48.

week.[584] However, at no point in either June or July 2003 was there any spraying anywhere in this part of the border region. Nor does Ecuador mention that the same report records that the residents of Yana Amarum claimed that the planes fumigated their territories, violating Ecuadorian airspace.[585] The spray flight data conclusively shows that there was no overspray of the village and that that claim is entirely false.

3.276. The evident falsity of these reported allegations clearly demonstrates the unreliable nature of this and other reports based on unverified allegations made by inhabitants of the border region that they had witnessed spraying, or suffered any effects.

3.277. As to Ecuador's reliance on the evidence of Witness 28, a resident of Yana Amarum, even assuming that the various allegations he makes as to the effects of the spraying should be understood to refer to spraying in 2002 (although his statement contains no specification as to the period of the spraying and there was no spraying anywhere remotely near the location of Yana Amarum in other years), it is likewise impossible that his allegations are true.

3.278. In particular, given the location and direction of spraying and its remoteness from Yana Amarum, the allegation of Witness 28 that the spray planes "came from Colombia, up to

---

[584] EM, Vol. IV, Annex 166, p. 18 (pages of Annex 166 in EM, Vol. IV appear mislabelled as Annex 165 on top right).

[585] EM, Vol. IV, Annex 166, pp. 17-18 (pages of Annex 166 in EM, Vol. IV appear mislabelled as Annex 165 on top right).

the San Miguel River" and that "they would cross to the Ecuadorian side and turn around", is not credible. Similarly, his claim that he "saw the smoke coming out of the planes and reaching our community", is wholly unbelievable, given that the nearest spray events took place more than 2.8 km distant.[586]

(c) Esmeraldas in 2000

3.279. In relation to the spraying within Colombia in the area adjacent to the Ecuadorian province of Esmeraldas, Ecuador suggests that "the evidence from Mataje […] demonstrates that the aerial sprayings began to exert their effects on the village also in late 2000."[587] It suggests that the evidence of witnesses 30, 32, 33, 34, 36, 37, 38 and 39 "belie Colombia's criticism of the 'vague' dates described in the statements of the Mataje residents."[588]

3.280. However, none of the witnesses from Mataje give any indication of the period in which the sprayings are alleged to have occurred; all of them merely allege – 8 or 9 years after the event – that they experienced spraying in 2000, without further specification. Ecuador's suggestion that the effects began to be felt in "late 2000" appears to be an extrapolation back from the spray data.

---

586 CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 93-94, Fig. 19; see also CR, Vol. I, Appendix, pp. 174-175, Fig. 19.

587 ER, para. 3.84.

588 ER, para. 3.86.

3.281. However, in light of the location of the closest spraying disclosed by the spray data, the allegations of the Mataje witnesses are simply not credible. A number of the witnesses quoted and relied upon by Ecuador in the *Reply*, allege that the spray planes directly sprayed over Ecuadorian territory.

- For instance, Witness 34, quoted at paragraph 3.85 of the *Reply* states that she was in her fields near Mataje when she saw "several planes above. […] They came and went several times. They made a noise and dropped a liquid".
- Similarly, Witness 36, quoted at paragraph 3.86, states that she saw "planes and helicopters flying over the river. From the planes, a white rain was coming out".

Quite apart from the total lack of specificity as to dates, the spray data disproves these allegations. From that data, it is clear that there was no spraying over Mataje in 2000 and indeed, there was no spraying anywhere in the vicinity of Mataje or the river during the course of 2000.

3.282. The closest spray events took place entirely within Colombian territory in September 2000, and were some 5.6 km away from the location of Mataje itself and some 4.5 km from the nearest point on the Mataje river.[589] The nearest spray event in August 2000 was even further away to the east; it is simply

[589] CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 95-96, Fig. 20; see also CR, Vol. I, Appendix, pp. 190-191, 206-207, 216-217, 222-223, 228-229, 234-235, 240-241 and 246-247, Fig. 20.

inconceivable that residents of Mataje, even if on the riverbank, would have heard, let alone seen, the spray planes.

3.283. In support of its assertions, Ecuador relies on a news report published in *La Hora* on 18 September 2000.[590] However, once the actual dates of the spray events are analysed, it is apparent that the closest spray events within Colombia took place only on 14 and 15 September 2000, and, as noted above, those spray events were in any case more than 5.6 km away from the location of Mataje.[591] Earlier spray events during the first week of September 2000 were concentrated considerably further to the east, some 15 km distant, whilst those in August 2000 were likewise some 13 km away.

3.284. Further, there is reason to doubt the allegations of a number of the witnesses resident in Mataje, due to their inconsistency with statements previously made in the *Dyncorp* proceedings.[592]

3.285. Thus Witness 33 alleges in his statement in these proceedings that "the first time that the planes came by spraying from Colombia was in the year two thousand. I was working the field, which is right next to the river. I saw some white planes,

---

590 ER, para. 3.88, quoting ER, Vol. IV, Annex 57.

591 CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, pp. 95-96, Fig. 20. See also, CR, Vol. I, Appendix, pp. 190-191, 206-207, 216-217, 222-223, 228-229, 234-235, 240-241 and 246-247; Fig. 20.

592 CR, Vol. VI, Annexes 73 and 74: Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM, Vol. IV, Annex 217, Witness 33); and Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM, Vol. IV, Annex 220, Witness 37), respectively.

escorted by some helicopters, spraying along the border." He goes on to allege that some of the spray fell on him.[593]

3.286. Quite apart from the fact that it is clear from the spray flight data that there was no spraying "along the border" anywhere in the region of Mataje in 2000 (the closest spray event to the border being more than 4.5 km away), in his questionnaire in the *Dyncorp* proceedings, Witness 33 claims that he witnessed spraying only in 2006, and that he was in the fields some 4 km from the border with Colombia when he was sprayed.[594] However, there was no spraying within Colombia anywhere near the border close to Mataje in 2006, and certainly no spraying 4 km within Ecuador.

3.287. Further, in his witness statement in these proceedings, Witness 33 states that at the time of the alleged spraying, the community used "the river and its tributaries to wash, bathe, cook and fish" and that "we would drink water from the river because we had no drinking water".[595] By contrast, in his statement in the *Dyncorp* proceedings, the witness states that his family had running water in their home, coming from "plumbing".[596]

3.288. It is also illuminating to contrast the evidence of Witness 33 with that of Witness 37, who, as is apparent from the

593 EM, Vol. IV, Annex 217.
594 CR, Vol. VI, Annex 73.
595 EM, Vol. IV, Annex 217.
596 CR, Vol. VI, Annex 73.

unredacted version of the witness statement, and from the questionnaires filed in the *Dyncorp* proceedings, is his father.[597]

3.289. Witness 37 in his statement in these proceedings claims spraying in 2000 and on two other occasions, the dates of which are not specified. He likewise alleges that in relation to the alleged spraying in 2000, that he was "working on my farm, at the edge of the river", when he saw "several planes and helicopters coming from the Colombian side, dropping a liquid". The coincidence with the allegations of Witness 33, his son, is striking and speaks for itself. In any case, as noted above, there was no spraying along the border in 2000 nor, quite clearly, in Ecuadorian territory as alleged.

3.290. Moreover, the evidence of Witness 37 in this regard is once again inconsistent with the allegations made in his questionnaire in the *Dyncorp* proceedings in which he only alleges spraying at the "End of 2003", at which time he claims that he was working near to the river and saw spray planes.[598] That allegation is itself not worthy of belief, insofar as spraying in 2003 took place only in the months of January, February, March and May, and not later in the year, and was in any case limited to a zone some 8 km to the east of Mataje.

(d) Esmeraldas in 2007, including as regards the Awá

3.291. Finally, in Section 1.D, Ecuador alleges that harm was suffered in Esmeraldas, including in particular as regards

---

[597] CR, Vol. VI, Annexes 73 and 74.
[598] CR, Vol. VI, Annex 74.

members of the Awá. Once again, although the title of the section suggests that Ecuador's claims are limited to the alleged effects in Esmeraldas in 2007, Figure 3.6 depicts spray events between March 2004 and December 2005 within a 10-km wide area along the border. In that regard, Ecuador asserts that "the greater Mataje area, including the Cayapas-Mataje Ecological Reserve to the west and the Awá Indigenous Reserve to the east, was *particularly hard hit* in 2004 and 2005, as shown by the flight data illustrated on Figure 3.6."[599] However, it puts forward no evidence in support of that statement for these years. There could be no clearer illustration of Ecuador's case theory that "if there was spraying, *ipso facto,* there must have been damage".

3.292. The lack of any other evidence of the effects allegedly suffered, including in particular scientific evidence taken from samples or other hard evidence of harm is particularly telling. As noted above, in 2003, the President of Ecuador had adopted a decree requiring the creation of a commission in order to monitor the effects of use of, *inter alia*, pesticides in the border regions with Colombia, including Esmeraldas.[600] But no results of any such spraying showing deposition of the spray mixture, or that any harm was caused, have been put forward by Ecuador.

3.293. Similar considerations apply *a fortiori* in relation to the spraying in 2007, on which Ecuador focuses. It is particularly

---

[599] ER, para. 3.98 (emphasis added).

[600] See above, para. 3.22 and CR, Vol. IV, Annex 44: Ecuadorian Foreign Ministry Court Filing N° 937-2004, 22 Oct. 2004, (Presidential Decree 1151 of 2003, Article 2), at p. 6.

significant that Ecuador has put forward no hard scientific evidence of damage caused by the spraying in Colombia from this period. As recalled in the *Counter-Memorial*, Colombia announced to Ecuador in December 2006 that it had resumed spraying in the border areas due to the alarming increase of illicit coca crops (72%) within the 10-km area.[601] If there had been any cogent evidence to collect of harm caused within its territory by spraying in Colombia conducted in early 2007, Ecuador undoubtedly would have done so. In the event, as discussed in the *Counter-Memorial*, Colombia announced to Ecuador on 9 February 2007, that sprayings had been suspended on that day.[602]

3.294. Further, the news reports from early February 2007 submitted by Ecuador make clear that members of the Ecuadorian military were fully aware of spraying within Colombian territory in early February 2007, and that the Ecuadorian High Command had been informed.[603] This was an opportunity to follow up on the reports of spraying: there was no reason why samples could not have been taken, or other evidence gathered if any damage had in fact occurred. Yet there are no samples and no scientific evidence, but only unsubstantiated assertions. In these circumstances, Ecuador's weak protestations that "obtaining corroborative physical evidence in the field is unusually difficult because of the

---

601 CCM, Vol. I, paras. 5.81, 5.83-5.84; see also, Vol. II, Annex 58 and Vol. III, Annex 148.

602 CCM, Vol. I, para. 5.92; Vol. II, Annex 28.

603 ER, Vol. IV, Annex 81; Annex 83.

remoteness of and the lack of resources in the areas involved"[604] do not withstand scrutiny. Moreover, when Ecuador chose to do so, it was able to obtain soil samples, as it did in 2004, both in Esmeraldas and Sucumbíos (although analysis of the samples found no glyphosate residues or any evidence of damage),[605] and to take samples of crops allegedly affected by the spraying (although again the results found that the plant diseases were the result of other causes).[606]

3.295. Ecuador's treatment of the damage allegedly suffered in Mataje in 2007 is exceptionally brief. It makes no allegation in its *Reply* as to harm to crops or animals in 2007 and focuses only on the alleged health effects suffered in Mataje,[607] relying on the evidence of Witness 33, who actually refers to alleged facts occurring in 2000.[608] Factors casting doubt upon the evidence of Witness 33 have already been dealt with, including the fact that the closest spraying in 2000, the year he refers to,

---

604 ER, para. 3.142.

605 See, CCM, Vol. II: Annex 80, Press Bulletin Nº 388 of the Ecuadorian Foreign Ministry, "No glyphosate residues exist in the waters of the rivers of the Sucumbíos province", 25 June 2004; Annex 81, Press Bulletin Nº 480 of the Ecuadorian Foreign Ministry, "No glyphosate residues were found in Esmeraldas, border with Colombia", 26 August 2004; Annex 82, Press Bulletin Nº 721 of the Ecuadorian Foreign Ministry, 24 December 2004; Annex 83, Memorandum of the Ecuadorian Foreign Ministry, 24 December 2004; Annex 84, Memorandum of the Ecuadorian Foreign Ministry, 29 December 2004; Annex 85, Press Bulletin N° 732 of the Ecuadorian Foreign Ministry, "Commission of the Foreign Ministry finds no evidence of sprayings following verifications in the entire area where sprayings were claimed to have been conducted", 30 December 2004; Annex 86, Press Bulletin Nº 027 of the Ecuadorian Foreign Ministry, 24 January 2005. See also the tests on soil samples in CR, Vol. IV, Annex 44, pp. 18-24.

606 CR, Vol. IV, Annex 44, pp. 31-40.

607 ER, paras. 3.101-3.102.

608 EM, Vol. IV, Annex 217.

took place in Colombian territory at a distance of over 5 km from his location.

3.296. Thereafter, relying upon the report of Dr Balslev,[609] Ecuador baldly asserts that the spraying in 2007 in Esmeraldas "posed serious risks to the environment" within Ecuador, including the mangrove forests in the Cayapas-Mataje Ecological Reserve.[610] However, as discussed in more detail below, Dr Balslev's report is framed solely in terms of potential risk and contains no findings or expression of opinion that actual damage was caused, including to the mangrove forests located in Ecuador. No other evidence of damage is put forward. The allegation that the mangrove forests had been or would be affected is, yet again, entirely unsubstantiated.

3.297. The remainder of the section focuses on alleged harm suffered by the inhabitants of the Awá reservation, relying in particular on the evidence of witnesses 40 and 41. However, as has already been discussed, the allegations of witnesses 40 and 41 are not credible. Both assert that they resided in Mataje Alto, which is located some considerable distance away from the border with Colombia. Both expressly assert spraying only in 2002, (although the closest spray events in 2002 took place almost 1 km from the closest point on the border, and were well over 6 km from Mataje Alto itself),[611] and are entirely vague as

609 ER, Vol. II, Annex 4.

610 ER, para. 3.103.

611 CR, Vol. II, Annex 18, DIRAN, Analysis of Certain Spraying Operational Aspects, October 2011, pp. 101-102, Fig. 23; see also CR, Vol. I, Appendix, pp. 252-253 and 258-259, Fig. 23.

to the dates of subsequent spraying. Quite apart from this, the statement of Witness 40 appears to indicate that he left Esmeraldas in 2007, when he moved to Ibarra.

3.298. As such, quite apart from the fact that the allegations of Witnesses 40 and 41 are undermined by other factors, their statements cannot be taken to provide any for the harm supposedly suffered in the Awá reserve in 2007.

3.299. Indeed, even ignoring those matters, it is clear even from Figures 3.6 and 3.7 in Ecuador's *Reply* that the closest spray events were at considerable distances from Mataje Alto, where the witnesses state that they resided.

3.300. Ecuador's suggestion that the spray data shows "a series of spray lines skimming the Mataje River marking the border between Colombia and the Awá Reserve, and coming particularly close to the village of Mataje Alto" in the period between March 2004 to December 2005,[612] clearly demonstrates the lengths to which Ecuador is prepared to go in twisting and distorting the factual evidence, in order to try to substantiate its baseless allegations.

3.301. As is evident from Ecuador's own Figure 3.6 as included in its *Reply*, which depicts spray events in 2004-2005, although there was some spraying close to the Mataje River in that period, it was not in the sector of the river closest to the location of Mataje Alto, or in that part of the river which constitutes the

612 ER, para. 3.109.

most northerly boundary of the Awá Reserve. Further, the misleadingly coloured concentric lines on Figure 3.6 show that even the closest spray event during this period was close to 5 km distant from Mataje Alto. In fact the closest line in 2004 was some 8.9 km from Mataje Alto, whilst the closest line during 2005 was 4.6 km away.

3.302. Similarly, insofar as the witnesses might be taken to be alleging spraying in 2007, Ecuador's own Figure 3.7 shows that the closest spray event in February 2007 was over 7 km from Mataje Alto, and in excess of 3 km from the sector of the Mataje River forming the northern boundary of the Awá Reserve. Colombia's analysis shows that the closest spray event was in fact 7.3 km from Mataje Alto.

3.303. As such, the allegations of Witnesses 40 and 41, are simply not credible.

(e) Conclusions as to the witness evidence

3.304. Ecuador has chosen to present its allegations that harm was suffered within its territory as the result of the spraying on the basis of four areas in relation to specified periods (although the areas in question are large, and the periods in question are long). It is to be presumed that those locations and time periods were chosen as representing its strongest case, on the basis of the evidence available to it, that damage was in fact caused.

3.305. However, as shown above, comparison of the spray flight data with the allegations of the witnesses demonstrates

that the vast majority of their allegations of having seen spraying and suffered its purported effects are, on their own terms, falsified by the spray data. The same is true of the supposedly "corroborative" material relied upon by Ecuador, which likewise reports unverified allegations made by individuals in the border communities of having seen or experienced the effects of spraying.

3.306. The falsity of the various allegations, when compared to the spray data, results most clearly from various wholly false allegations of overspray made by a number of the witnesses, and by other individuals. However, even in relation to the allegations of those witnesses who limit themselves to asserting in their statements in the present proceedings that they observed planes spraying across the border in Colombia, and/or that they experienced adverse effects as a result of drift of the spray mixture, the spray data shows that those claims are not deserving of belief. Again, the same is true as regards the similar claims of individuals reported in the secondary material. The closest spray events at any relevant time within the entirely vague periods alleged were simply too far away either for the spray operations to have been observed, of for anything other than tiny, insignificant amounts of drift to have been deposited within Ecuadorian territory.

3.307. On this basis alone, Ecuador's case as to harm must fail. However, as will be shown in the following section, in addition, in the light of the scientific evidence, the allegations of the witnesses as to the various harms to health, animals and plants

(and the similar claims of individuals from the border reported elsewhere), are likewise simply incredible.

D. Summary Assessment of the Scientific Evidence

3.308. Having shown in the preceding section that Ecuador's case as to the time and location of the spraying are manifestly false, the present section provides a summary of the scientific evidence which demonstrates that in any case, the spray mixture, given the location and manner in which it was sprayed, simply could not have caused the various effects alleged by Ecuador.

3.309. As noted above, Ecuador has put forward no hard scientific evidence (as opposed to unsupported allegations) that damage has occurred as a result of the spraying within Colombian territory. In particular, there is no scientific evidence, based on soil or water samples, that the spray mixture was ever deposited on Ecuadorian territory, nor any evidence that it caused any damage therein. Ecuador's case as to harm is entirely based on unsupported, unsubstantiated allegations.

3.310. However, by contrast and quite apart from the absence of any proof of either deposit or harm, all of the available scientific evidence points to the conclusion that the spray mixture applied within Colombia did not reach Ecuadorian territory in any significant quantities, and in any case, that it is simply incapable of causing the effects alleged by the various witnesses relied upon by Ecuador and the other supposedly supporting evidence.

3.311. The so-called "scientific" evidence put forward by Ecuador together with its *Reply* as to the supposedly harmful properties of the spray mixture is expressed in terms of possibility or potentiality, rather than in terms of any firm conclusion that the damage has in fact occurred as alleged by Ecuador. Further, the reports relied upon by Ecuador are flawed in their approach, and are either based on incorrect assumptions, or misunderstand the relevant principles.

(1) THE ASSERTED "VULNERABILITY" OF THE ECOSYSTEM AND BORDER POPULATIONS IN ECUADOR

3.312. It is convenient first to dispose of the reports by Professor Balslev and by Professor Whitten and his colleagues which purport, respectively, to assess the supposed "vulnerability" of the ecosystem and populations of the border regions in Ecuador. Neither report provides any support at all for Ecuador's case as to damage.

3.313. The report of Professor Balslev paints a detailed picture of the supposed "vulnerability" of the ecosystem in the border region, illustrated by pictures of bears and frogs. However, the report is entirely inconclusive as to whether any harm has in fact occurred. A number of observations are justified.

3.314. First, the report by Professor Balslev discusses the entire border region, including a number of areas of habitats (including cloud forests and the grass páramo and super páramo),[613] in which, due to the altitude, coca is not and cannot be grown. In

[613] Balslev, ER, Annex 4, pp. 16-18.

relation to these areas Ecuador does not allege that any spraying took place, nor that any damage has been caused.

3.315. Second, and more significantly, Professor Balslev expresses no view as to whether damage has in fact occurred as a result of spraying within Colombia. In this regard, it is sufficient to refer to Dr Balslev's ultimate conclusion, contained in the final sentence of the last paragraph of the report, that:

> "Aerial spraying with herbicides in this border region has the *potential* to cause significant damage to one of the World's richest and most diverse biological treasures".[614]

3.316. It is significant that Ecuador's own expert did not feel able to pitch his conclusions any higher than a general observation framed in terms of pure possibility. The statement quoted expresses no conclusion as to whether any harm has in fact occurred within Ecuador as the result of spraying. Nor, indeed, does Professor Balslev express any opinion as to whether the "significant damage" may even potentially result from drift, rather than from direct overspray of the areas in question, nor the quantity of deposition of spray mixture which would have to be deposited in order to cause such damage. As Dr Dobson cogently observes, "This is an assertion for which no evidence that the potential for harm is being realised is presented".[615]

---

614 Balslev, ER, Annex 4, p. 51 (emphasis added).

615 CR, Vol. II, Annex 4: Dobson Report (2011), para. 13.

3.317. All the more so, since, as Colombia showed in its *Counter-Memorial* and in Chapter 2, the spray mixture does not cause the alleged damages to ecosystems or populations; it is innocuous for humans and animals.

3.318. Similarly, the report by Professor Whitten and his colleagues,[616] which is likewise enriched by a large number of colour photographs, gives a detailed anthropological account of the lifestyles of the various indigenous and other communities resident in the border region in Ecuador.

3.319. Again, the report does not provide any evidence of harm within Ecuador; once again, a number of observations are justified.

3.320. First, it is to be noted that the report covers a number of indigenous peoples who are not resident in the immediate region of the border between Ecuador and Colombia, and as to whom Ecuador has not suggested that any harm has been caused. This is particularly the case as regards the Siona and Secoya peoples, who reside principally within the Cuyabeno Wildlife Reserve, the closest point of which is located some 10 km to the south of the Putumayo River in Sucumbíos.[617]

3.321. Second, it appears that in preparing their report, the authors did not travel to the border regions of Ecuador, but

---

616 Whitten *et al.*, ER, Vol. II, Annex 5.

617 *Ibid.*, pp. 32. Whitten *et al*. note that, in addition, there are some Siona households located along the San Miguel river, to the north of the Cuyabeno Reserve. No specific evidence is presented of harm to these people.

merely relied on the anthropological literature, their own general knowledge and experience of the communities in question. Significantly, the report does not recount that the authors conducted any interviews with any of the members of the communities described in relation to their alleged experience of the harms alleged by Ecuador, supposedly as a result of the spraying.

3.322. Third, as a consequence, the author's conclusions are framed entirely in terms of possibility and an inchoate, unquantified potential for harm to the way of life and livelihood of the border communities. The report is replete with such observations as to the possibility of harm, expressed in conspicuously general terms. For instance, the authors observe variously that:

> "As an indigenous nation with deep cultural and economic ties to their homeland, the Cofán are especially vulnerable to activities that compromise the ecological integrity of their territory."[618]
>
> "Kichwa-speaking people rely on a predictable rain-forest-riverine dynamic ecosystem, to which their economic, social, and cultural lives are well adapted. However, due to their heavy reliance on the natural environment, they are acutely vulnerable to perturbations that depart from these natural cycles, which can cause significant disruptions to their subsistence and sacred realms."[619]
>
> "The Afro-Ecuadorians of Esmeraldas are highly vulnerable to environmental perturbations, particularly those which might cause the destruction

[618] Whitten *et al.,* ER, Vol. II, Annex 5, p. 26.
[619] *Ibid.*, p. 31.

> of the crops and aquatic resources upon which they rely so heavily."[620]

3.323. In relation to the Awá, the authors of the report note that,

> "[g]iven the fragility of the Awá ecosystem in its diversity and the charge to them to maintain their aboriginal role as guardians of the environment, perturbations take on added dimensions."[621]

3.324. The report by Whitten and his colleagues says nothing as to whether any harm of the type discussed has in fact occurred as a result of spraying within Colombia; again it is phrased solely in terms of potentialities.

3.325. Given the modeling of drift carried out by Dr Hewitt, it is clear that spray drift from spraying within Colombia did not reach Ecuador in quantities capable of causing any damage to plants or animals. As such, given that the spray mixture cannot cause the damages alleged by Ecuador even as a result of direct overspray, let alone by drift, harm of the types that Whitten *et al*. discuss could not have been suffered as a result of spraying within Colombia by any of the communities resident along the border in Ecuador.

3.326. Finally, as with the report of Professor Balslev, the formulation of the ultimate conclusion of the Whitten *et al.* report is telling; Professor Whitten and his colleagues merely conclude that:

---

620 Whitten *et al.,* ER, Vol. II, Annex 5, p. 53.

621 *Ibid.*, p. 45.

> "Due to their heavy reliance on environmental resources, border communities are extremely vulnerable to perturbations that upset this balance. Thus, exposure to herbicide that causes loss of crops, damage to forest resources, death of domesticated animals, or sickness, *would have* grave consequences for their health and livelihood."[622]

3.327. Even assuming that the assertion contained in the first sentence of the quoted paragraph is true, clearly it is entirely general, and is applicable equally and indiscriminately to "perturbations" resulting from any other cause, including deforestation due to logging, environmental damage due to oil and mineral extraction activities, and pollution, including pollution resulting from the use of pesticides and herbicides for the purposes of agriculture within Ecuador itself. On any view, the statement is not limited solely to the alleged harm supposedly resulting from spraying within Colombia.

3.328. However, in addition, given the postulate of the first sentence, the second sentence simply begs the question of whether any harm causing "loss of crops, damage to forest resources, death of domesticated animals, or sickness" has in fact occurred as a result of "exposure to herbicide". Indeed, on its face, the statement is entirely neutral as to the source of the exposure to herbicide which might cause damage. State responsibility under international law for environmental harm is not the result of a "would have". It is not subjunctive.

---

622 Whitten *et al.,* ER, Vol. II, Annex 5, p. 53 (emphasis added).

3.329. As such, as with the report of Dr Balslev, the report of Dr Whitten and his colleagues expresses no conclusions as to whether any harm has occurred as a result of the spraying of herbicide within Colombia, nor indeed whether any harm of the type identified as potentially resulting from exposure to herbicide has in fact occurred at all. As such neither report is of any assistance to Ecuador in making out its case on harm.

(2) ECUADOR'S CASE PROCEEDS ON THE BASIS OF A FLAWED APPROACH TO RISK MANAGEMENT

3.330. The principal "scientific" evidence of the harm which may allegedly be caused by the spray mixture relied upon by Ecuador is the report of Menzie and Booth.[623]

3.331. However, as explained by Dr Solomon and Dr Dobson, the approach adopted by Menzie and Booth in suggesting allegedly appropriate protective levels of exposure is fundamentally flawed and perpetuates many of the errors contained in the report annexed to Ecuador's *Memorial*.[624]

3.332. Errors in the approach of Menzie and Booth occur at each of the stages of assessment of the potential hazards posed by the spray mixture, their discussion of the possible uncertainties as to those hazards, and finally as regards their proposed means of managing any uncertainty. This is particularly so insofar as their report, *inter alia*:

---

623 ER, Vol. II, Annex 6.

624 EM, Vol. III, Annex 158.

- is based on the flawed modeling of drift, which ignores the intercepting effect of vegetation;[625]
- assumes extra vulnerability of humans in the border region, without any scientific support for that assumptions;[626]
- makes unsupported assertions as to extra vulnerability of non-human organisms in Ecuador, in particular amphibians and plants, without any support and in disregard of the existing scientific literature, the results of the CICAD II studies, and the conclusions of Dr Dobson's reports;[627]
- makes no attempt to quantify uncertainty, and in any case, is biased in the way that uncertainty is applied;[628]
- takes account of the possibility of extreme adverse events, with no assessment of the probability of such events occurring (which is low);[629]
- simply assumes, with no scientific basis, that any risk factors (to the extent that they actually exist), are necessarily cumulative;[630] and
- in any case, fundamentally misunderstands the logic of risk assessment,[631] and inappropriately relies upon the

---

625 CR, Vol. II, Annex 3: Solomon Report (2011), para. 1(e).

626 CR, Vol. II, Annex 4: Dobson Report (2011), para. 37; CR, Vol. II, Annex 3: Solomon Report (2011), para. 46.

627 CR, Vol. II, Annex 4: Dobson Report (2011), para. 38; CR, Vol. II, Annex 3: Solomon Report (2011), paras. 47-49.

628 CR, Vol. II, Annex 3: Solomon Report (2011), para. 38.

629 *Ibid.*, para. 56.

630 *Ibid.*, para. 39.

> supposed existence of uncertainty where no such uncertainty in fact exists, in order to justify the adoption of more protective maximum exposure rates.[632]

3.333. As regards the potential risks of exposure to the spray mixture, as Dr Solomon notes (and as is discussed further below),

> "Contrary to claims by Ecuador, there is a robust data set with which to assess the risks of the spray in non-target species. When this rich data set of information on toxicology and fate in the environment is combined with the refined estimates of spray drift, there is no environmental or human health risk in Ecuador."[633]

As a consequence, there is little uncertainty as to the hazards posed by the spray mixture, and no basis for implementation of additional safety margins over and above those already incorporated in the generally accepted maximum levels of concern.

3.334. Further, as Dr Solomon goes on to explain, given, *inter alia*, the existence of the substantial and "robust" scientific literature as to the risks posed by exposure to the spray mixture, and their reliance on Ecuador's flawed modeling of drift (which disregards the existence of canopy downwind from the spray site and its intercepting effects), Menzie and Booth's proposals for the appropriate management of uncertainty (through the introduction of safety factors) is open to serious criticism:

---

631 CR, Vol. II, Annex 3: Solomon Report (2011), paras. 1, 75.
632 CR, Vol. II, Annex 4: Dobson Report (2011), paras. 60-61.
633 CR, Vol. II, Annex 3: Solomon Report (2011), para. 1(f).

> "In the section on managing uncertainty for risk-based decision making, Menzie and Booth […] argue that, in the face of uncertainty, large safety factors are necessary for making decisions that are protective. They further argue that there is great uncertainty due to lack of knowledge. However, their own evidence is also lacking in knowledge and is flawed. The modeling on which their estimates of exposure were based was unrealistic as it failed to consider the presence of trees that would act to intercept drift with the result that their estimates of exposures are thus highly exaggerated. They claim that the toxicity of the spray mixture(s) is unknown, whereas it is well documented. They claim that the uncertainty factors are not used, when they were. The reference dose (RfD) used as a comparison for exposures of humans was derived by the US EPA by the use of uncertainty factors. Menzie and Booth also imply that the database for glyphosate is 'poor' […] whereas it is very robust for both human and ecological endpoints. This is illustrated in the wealth of data in published assessments from regulators […], and the work of the SAT [sc. the CICAD Scientific Assessment Team]."[634]

3.335. As a consequence, when account is taken of the more realistic modeling of drift carried out by Dr Hewitt (discussed in the next sub-section), the resulting exposures to the spray mixture,

> "all include large margins of safety, i.e., they are all thousands of times less that exposures of concern."[635]

Given that this is so, there is no justification for any more cautious approach – given the likely amounts of deposition in

---

634 CR, Vol. II, Annex 3: Solomon Report (2011), para. 57.

635 *Ibid.*, para. 57.

Ecuador, the levels of concern which result from the existing literature are already highly protective.

(3) ECUADOR'S CASE PROCEEDS ON A FLAWED APPROACH TO MODELING DRIFT

3.336. The evidence of Ecuador's expert as to drift of spray mixture, Dr Giles, has been dealt with extensively in Chapter 2.

3.337. In summary, first, in modeling drift, Dr Giles utilizes extreme values for a number of the variables used for the model. Second, Dr Giles fails to take account of the presence of vegetation in the border region which has a substantial effect in intercepting the spray mixture, and thus reducing the quantity of drift downwind. Finally, contrary to the prevailing trend of meteorological conditions in the border region, Dr Giles assumes that the wind always blows from Colombia towards Ecuador.

3.338. As to the first point, although applying widely-accepted models of drift, Dr Giles takes extreme values for speed, height, humidity and application rates. As such, his modeling is invalid for the vast majority of spray events in the immediate vicinity of the border.

3.339. In this regard, although the report by Hansman & Mena submitted by Ecuador provides details of the spray events having the highest altitudes and aircraft speeds,[636] they do so on the basis of the entire dataset of spray events within 10 km of

[636] ER, Vol. II, Annex 1, pp. 11, 18, 20-22.

the border. But spray events at distances of up to 10 km from the border are irrelevant given that they could, at most, result in the deposit of infinitesimally small quantities of spray mixture within Ecuador as a result of drift; moreover any such deposition would not be concentrated in any one location but would be spread out over a vast area.

3.340. Even using extreme values, Dr Giles' conclusions as to deposition at distances of more than 800m results in deposition rates which are far below the protective levels of concern for damage to plants and for damage to farmyard animals.

3.341. Colombia's own analysis of the sub-set of spray events within the relevant area shows that only a tiny proportion of spray events were at the extreme values for speed and/or altitude used by Dr Giles.[637]

3.342. Second, and more importantly, Dr Giles' assumption that the border area is entirely devoid of vegetation compounds the overestimation deriving from the assumption of extreme values for speed and altitude. Dr Giles proceeds on the counter-factual basis that the border area is flat and featureless and devoid of any vegetation as well as ignoring the prevailing wind direction. This results in a further, additional massive overestimation of drift downwind from spray events, even assuming that the wind was blowing from Colombia towards Ecuador. As Dr Hewitt observes, Dr Giles in his modeling:

---

[637] See above, paras. 2.132-2.133 (speed), 2.145, 2.147 (height); also, CR, Vol. II, Annex 5: IMA Report (2011), Table 3, p. 6, and Table 8, p. 12.

> "...ignores the most important variable in the present scenario which is closer to forest spraying than to spray applications over low crops or bare ground – namely the presence of extensive canopy vegetation (trees and shrubs) in the area of the spray applications and downwind of the applications, between Colombia and Ecuador. These vegetation surfaces and structures act as excellent capturing media for airborne droplets, thereby reducing spray drift to *de minimis* levels within a few hundred meters of the applications. When properly accounted for in the modeling, this canopy reduces the spray deposition values from those reported by Giles to values that represent *de minimis* drift..."[638]

3.343. In this regard, the modeling by Dr Hewitt of the "worst case" spray lines closest to the border resulted in predicted deposition rates of between 0.001 and 2.71 g/ha on the Ecuadorian bank of the border river. Indeed, out of the 72 lines he modeled, only 13 were over 1 g/ha, i.e., 82% were below 1 g/ha.

3.344. Those values are far below the any relevant level of concern which has been suggested by either party.

3.345. Finally, Dr Giles simply assumes that the wind constantly blows from Colombia towards Ecuador, and at speeds close to the operational parameters set under Colombia's EMP. However, the meteorological data shows that the dominant trend is for winds to blow from Colombia towards Ecuador, and

[638] CR, Vol. II, Annex 1: Hewitt Report - Response to Giles (2011), para. 2, p. 3.

further, that wind speed is generally relatively low.[639] As Dr Hewitt observes,

> "spray drift is directional and only occurs in the downwind direction. Predominant wind directions in the border region between Colombia and Ecuador include winds blowing away from Ecuador which means that most of the time, any spray drift that does occur will be away from Ecuador."[640]

3.346. As such, quite apart from the disregard by Dr Giles of the strong intercepting properties of trees and vegetation in the border region, Dr Giles' modeling is not valid whenever the direction of the wind was from Ecuador towards Colombia. Although detailed data for specific dates is not available, given the general trend of wind direction in the border region and precautionary measures taken, it is most likely that the majority of spray events took place at times when the wind was blowing away from Ecuador.

(4) THE SCIENTIFIC EVIDENCE DEMONSTRATES THE LACK OF SIGNIFICANT TOXICOLOGICAL EFFECTS OF THE SPRAY MIXTURE FOR HUMANS OR ANIMALS

3.347. There is an overwhelming body of scientific evidence which demonstrates that glyphosate in particular, and the formulated spray mixture as used in the spraying program more generally, does not have significant toxicological effects for

---

639 CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of the Nariño and Putumayo Border Zone with Ecuador*, Dec. 2011, Vol. II pp. 706-730.

640 CR, Vol. II, Annex 1: Hewitt Report - Response to Giles (2011), para. 2, p. 3.

humans or animals. This is so even in relation to exposure resulting from direct overspray.

3.348. The conclusion that the spray mixture has *de minimis* toxicological effects is even more evident in relation to exposure to the, at most, tiny quantities of the spray mixture which could occur within Ecuador as a result of drift due to spraying within Colombian territory.

3.349. As Dr Solomon, a world-leading expert on toxicology, including in particular the toxicological effects of glyphosate, explains, the scientific studies carried out as part of CICAD I showed that the

> "...exposures expected from a direct overspray provide a margin of safety that would be protective (Solomon et al. 2007b) of just such a scenario. The *de mimims* exposures resulting from spray-drift would be so small and infrequent that these interactions would not occur."[641]

3.350. Dr Solomon is unequivocal as to his conclusions in his report in these proceedings. Overall, he expresses the considered expert view that the case put forward in Ecuador's *Reply* (and the supporting expert reports on which it is based) is,

> "...based on a lack of understanding of the basic principles of toxicology and risk assessment, misinterpretation of data, erroneous use and interpretation of data and selective citations of the literature. It provides no proof that the spray used for control of coca in Colombia drifted into Ecuador

641 CR, Vol. II, Annex 3: Solomon Report (2011), para. 46.

> in any amounts, let alone toxicologically significant quantities, or that any harm occurred."[642]

3.351. As explained in Chapter 2,[643] the commercial formulations containing glyphosate used over the course of the spraying program are, as Dr Solomon affirms, "toxicologically similar."[644] Further, all of the spray mixtures used present only a *de minimis* risk to humans and animals:

> "Toxicologically, there is no difference between the formulations of glyphosate used in the spray program. As sprayed in Colombia, formulations present *de minimis* risk to humans and non-target animals."[645]

Thus, all of Ecuador's discussion in this regard is irrelevant.

3.352. Although Ecuador attempts to make much of the hazard labels on the packaging of the undiluted, concentrated ingredients used in the spray mixture, its argument simply ignores the fact that the spray mixture as applied is substantially diluted with water, and the spray mixture presents no hazard to humans "as sprayed".[646] A similar conclusion applies as to the hazard for animals. As Dr Solomon observes:

> "There is confusion between the toxicity of the concentrated product and the diluted spray. Based on tests with the spray mixture *as used on coca*, the risks to humans and animals are *de minimis.*"[647]

---

642 CR, Vol. II, Annex 3: Solomon Report (2011), para. 75.
643 Paras. 2.84-2.95, above.
644 CR, Vol. II, Annex 3: Solomon Report (2011), para. 74.
645 *Ibid.*, para. 1(a).
646 *Ibid.*, para. 12.
647 *Ibid.*, para. 1(b) (emphasis added).

3.353. Dr Solomon's opinion as to the toxicological effect of the spray mixture as such, on animals and humans is based, *inter alia*, on the results of the tests of the Alpha, Bravo and Charlie spray mixtures carried out by Springborn Laboratories in 2002 and 2003 on behalf of the US Department of State and reviewed by the United States EPA for the purposes of certification.[648] As Dr Solomon records, those studies constitute strong scientific evidence, based on tests run in accordance with internationally accepted good laboratory practices, that "none of the glyphosate-products used in the spray programs for coca and poppy in Colombia present a hazard to humans as sprayed".[649] In fact, as Dr Solomon notes, all three mixtures as sprayed were classified as Category III, based on irritancy to the eyes, a rating "similar to shampoo, vinegar, and a number of other household products."[650] This is also confirmed by the EPA: that agency confirms that all these formulations are classified as Category IV – the lowest toxicity for an herbicide, and only on the basis of a possible mild irritancy to the eyes, are some of them classified as Category III, which is still low, and innocuous.[651]

3.354. In this regard, Dr Solomon further explains that the inclusion of POEA in the various formulated spray mixtures did

---

[648] CR, Vol. V, Annexes 56 A-C.

[649] CR, Vol. II, Annex 3: Solomon Report (2011), para. 12.

[650] *Ibid.* See also, Vol. II, Annex 15, Krieger, p. 9, citing Maibach (1986) in relation to skin irritation; and Vol. IV, 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 Sep. 2011, Answers to Questions 8 and 9, pp. 5-6.

[651] CR, Vol. IV, 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 Sep. 2011, Answer to Question 9, p. 6.

not affect their toxicological properties: again, the test results on each of the Alpha, Bravo and Charlie spray mixtures carried out in 2002 and 2003, showed a "complete lack of significant oral, dermal, and inhalation toxicity of the spray mixture". As Dr Solomon concludes, this "demonstrates that the exposures from the diluted spray are below the threshold of toxicity."[652]

3.355. Ecuador attempts to make much of the supposedly unknown composition of the adjuvant Cosmo-Flux 411F, and misleadingly suggests that the supposed four-fold increase in the effectiveness of the spray mixture on plants applies generally. Dr Solomon explains why both allegations are misplaced. His conclusion is likewise that Cosmo-Flux 411F in the quantities present in the spray mixture

> "...is of low toxicity to animals and does not enhance the toxicity of the spray mixture to animals."[653]

3.356. It bears noting that the CICAD I study likewise concluded that

> "...the addition of the adjuvant Cosmo-Flux® to the glyphosate did not change its toxicological properties to mammals."[654]

As observed by Dr Solomon, that conclusion is again supported by the results of the 2002 and 2003 tests on the Alpha, Bravo and Charlie spray mixtures.[655]

---

652 CR, Vol. II, Annex 3: Solomon Report (2011), para. 13.
653 *Ibid.*, para. 1(c).
654 *Ibid.*, para. 16, quoting Solomon *et al.* 2007b.

3.357. As to the supposedly "secret" composition of Cosmo-Flux 411F, as Dr Solomon explains, its composition is clearly listed on its label.[656]

3.358. Second, although Ecuador suggests, relying on the report by Dr Weller, that the inclusion of Cosmo-Flux 411F results in a four-fold enhancement of the toxicity of glyphosate to plants, Dr Solomon's view is that that conclusion is not supported by the scientific literature.

3.359. As Dr Solomon notes, the paper by Collins and Helling (2002) relied upon by Dr Weller relates to the effects of other adjuvants on the efficacy of the spray mixture and did not involve testing of Cosmo-Flux 411F; in any case the four-fold increase in efficacy of those adjuvants which were tested, as recorded by Collins and Helling, was in relation to a formulation of glyphosate without other surfactants.[657]

3.360. Further, as Dr Solomon observes, a more recent study involving formulated glyphosate mix (Gly-41), mixed with Cosmo-Flux 411F, in fact resulted in little enhanced efficacy on coca.[658] In Dr Solomon's words, to extrapolate from claims made in advertising materials produced by the manufacturer of Cosmo-Flux 411F, "demonstrates gullibility in the extreme", and this is particularly so in circumstances in which the claim

---

655 CR, Vol. II, Annex 3: Solomon Report (2011), para. 16.

656 *Ibid.*, para. 15; EM, Vol. III, Annex 113 (Cf. EM, Vol. III, Annex 114).

657 CR, Vol. II, Annex 3: Solomon Report (2011), para. 62.

658 *Ibid.*, referring to Marshall et al 2009.

does not relate specifically to the effects of Cosmo-Flux 411F when combined with glyphosate.[659]

3.361. On that basis, Dr Solomon's view is that "there is no support for the claim that Cosmo-Flux 411F enhances the efficacy of formulated glyphosate to a significant degree".[660] At most "[e]fficacy in plants may be enhanced to a small degree but not the 4-fold claimed."[661]

3.362. Further, although Dr Weller extensively discusses the supposed "enhanced toxicity"[662] of glyphosate due to the addition of Cosmo-Flux 411F, that discussion "is moot as this enhanced toxicity does not occur."[663] At most the question is one of increased efficacy of the spray mixture on plants, due to greater penetration by the action of surfactants, and not one of any greater toxicity of glyphosate, the active ingredient. As Dr Dobson observes in relation to the same argument made by Dr Weller:

> "If a plant would have been killed anyway by a spray not containing Cosmo-Flux 411F, the addition of Cosmo-Flux 411F would not influence the result of spraying – the dead plants cannot die more than once."[664]

3.363. As Dr Dobson observes, the only effect that Cosmo-Flux 411F might have upon the efficacy of the spray mixture, is that

---

659 CR, Vol. II, Annex 3: Solomon Report (2011), para. 62.
660 *Ibid.*
661 *Ibid.*, para. 1(c).
662 *Ibid.*, para. 62, referring to Weller, ER, Vol. II, Annex 3, p. 16.
663 *Ibid*.
664 CR, Vol. II, Annex 4: Dobson Report (2011), para. 15.

"plants with some protection from waxy cuticles might be killed at a lower dose of herbicide than would otherwise be the case".[665]

3.364. Independent studies show both that Cosmo-Flux 411F itself is not highly toxic to species of fish present in Ecuador, apparently "does not significantly enhance the toxicity of formulations of glyphosate to plants or to fish",[666] and does not have the effect of increasing toxicity of glyphosate spray mixtures to the tadpoles of certain species.[667]

3.365. Finally, taking into account the modeling by Dr Hewitt as to the spray events closest to the border, taking account of the intercepting effect of vegetation, the conclusion of Dr Solomon is that

> "Refined modeling of spray drift that incorporated all of the worst case assumptions but also included interception by trees shows only very small amounts of spray-drift at distances close to the spray swath and that, in most cases no deposition occurred in Ecuador or, if drift occurred at all, amounts were extremely small and toxicologically insignificant."[668]

(a) Human health

3.366. Examining in more detail the supposed risks to human health of exposure to the spray mixture, Dr Solomon, based on the scientifically rigorous CICAD I and II studies, is clear; his overall conclusion is that:

---

665 CR, Vol. II, Annex 4: Dobson Report (2011), para. 15.
666 CR, Vol. II, Annex 3: Solomon Report (2011), para. 17.
667 *Ibid*.
668 *Ibid.*, para. 1(e).

> "...the mixtures as sprayed in Colombian territory do not present a hazard to humans in that country. Given the greatly reduced or non-existent exposures in Ecuador, the spray mixture presents no hazard to humans and the environment in Ecuador."[669]

3.367. That conclusion accords with his previous published conclusion, expressed jointly with the colleagues with whom he carried out the independent CICAD I studies, that the outcome of the risk assessment for humans in Colombia was that the risk of adverse effects was negligible, even from a direct overspray.[670]

3.368. It may further be noted that the weight of scientific evidence is clear that neither glyphosate nor Roundup (i.e. a mix containing glyphosate as the active ingredient, formulated with POEA) are carcinogenic.

3.369. Professor Williams is the lead author of the leading literature review as to the potential carcinogenic and genotoxic properties of glyphosate and Roundup formulations, published in 2000. His expert opinion in his report filed in the *Dyncorp* proceedings, having examined literature subsequent to that review remained that "the available evidence attests to the

---

669 CR, Vol. II, Annex 3: Solomon Report (2011), para. 22.

670 Solomon, K.R., Anadon, A., Carrasquilla, G., Cerdeira, A., Marshall, E.J.P, and Sanin, L.H., 2007. Coca and poppy eradication in Colombia: Environmental and human health assessment of aerially applied glyphosate. *Rev Environ Contam Toxicol* 190:43-125. Available at: http://www.adkn.org/assets/adkn_49.pdf (Last visited 10 Nov. 2011); CCM, Vol. III, Annex 116: CICAD I, p. 90.

noncarcinogencity of glyphosate and glyphosate-based herbicides".[671]

3.370. In this regard, in reviewing the existing literature in early 2011, Professor Williams discussed a study by Paz-y-Miño et al (2007),[672] which speculated that there might be a link between alleged exposure of individuals resident near the Ecuador-Colombia border and observed apparent genotoxic effects. Professor Williams noted that that study suffered from "methodological deficiencies" which "preclude any reliable scientific conclusion".[673]

3.371. Subsequent to the report of Professor Williams in the *Dyncorp* proceedings, in 2011 Dr Paz-y-Miño, together with a number of co-authors, published a further paper based on a later, more extensive study of individuals resident near the border region in Ecuador, apparently conducted in 2009.[674] In particular

---

671 CR, Vol. II, Annex 16: Expert Report of Dr G.M. Williams, M.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 8.

672 Paz-y-Miño C, Sánchez ME, Arévalo M, Muñoz MJ, Witte T, *et al.* "Evaluation of DNA damage in an Ecuadorian population exposed to glyphosate". Genet Mol Biol 2007; 30:456-60.

673 CR, Vol. II, Annex 16: Expert Report of Dr G.M. Williams, M.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 7.

674 Paz-y-Miño C, Muñoz MJ, Maldonado A, Valladares C, Cumbal N, Herrera C, Robles P, Eugenia Sánchez M, López-Cortés A, "Baseline determination in social, health, and genetic areas in communities affected by glyphosate aerial spraying on the northeastern Ecuadorian border", *Rev Environ Health* 26:45-51; interestingly, the co-authors include Dr Adolfo Maldonado, who had been active in the border area on behalf of Acción Ecológica in the early years of spraying: see e.g. EM, Vol. IV, Annex 162, p. 5; EM, Vol. IV, Annex 164 and ER, Vol. III, Annex 32; see also EM, Vol. IV, Annex 165, p. 11 and 21 where it is recorded that the members of the "Verification Mission" led by the Ecuadorian Ministry of the Environment, as a part of their visit met with, inter alia, Dr Maldonado and other representatives of *Acción Ecológica* (although the English translation at p. 11

individuals resident in Sucumbíos in the communities of "Chone-2, Yanamarum [sic], Playera Oriental, Fuerzas Unidas, Puerto Escondido, Corazon Orense, Santa Marianita, San Francisco, and Las Salinas 5 de Agosto [sic]" were analysed; the names of the majority of these communities will be familiar given that they are the same communities in which a number of the witnesses relied upon by Ecuador reside, or which are mentioned in the press reports.

3.372. It appears that the study is no better than that conducted in 2007 led by Dr Paz-y-Miño insofar as it merely assumes, based on the assertions of the individuals unsupported by any concrete evidence, that they had in fact been exposed to the spray mixture. It is thus open to many of the same criticisms noted by Professor Williams in his report as to methodological deficiencies.

3.373. However this may be, the conclusion of the paper was that the results obtained showed "no chromosomal alterations in the analyzed individuals" and that "the study population did not present significant chromosomal and DNA alterations.[675]

3.374. As to other alleged harms to human health, the various symptoms allegedly suffered by the witnesses in the present proceedings parallel those made by the plaintiffs in the *Dyncorp*

---

erroneously records that he was present as a "representative of the Ombudsman for Indigenous People".

[675] Paz-y-Miño C, Muñoz MJ, Maldonado A, Valladares C, Cumbal N, Herrera C, Robles P, Eugenia Sánchez M, López-Cortés A, "Baseline determination in social, health, and genetic areas in communities affected by glyphosate aerial spraying on the northeastern Ecuadorian border", *Rev Environ Health* 26, pp. 50, 45, respectively.

proceedings, including skin irritation, eye irritation, gastrointestinal symptoms and respiratory injuries.

3.375. In this regard, the expert report submitted in the *Dyncorp* proceedings by Dr Krieger[676], an expert in human and animal toxicology, fully corroborates the views of Dr Solomon.

3.376. As in the present case, in the *Dyncorp* proceedings it is clear that there is a lack of any concrete evidence other than the bare assertions by the plaintiffs that they were actually exposed to the spray mixture - in that regard Dr Krieger notes that reliable data as to exposure/dose is a necessary prerequisite to any assessment of the potential health effects of the spray mixture.[677]

3.377. Notwithstanding the lack of any such proof of exposure, the expert opinion of Dr Krieger is that the claims of the plaintiffs in the *Dyncorp* proceedings are simply not consistent with exposure to the spray mixture, and the harms alleged could not have been caused by such exposure even if it had occurred. His conclusions are equally applicable to the claims of damage to human health made by the witnesses in the present proceedings.

3.378. As to the potential for skin irritation, relying on *inter alia*, the Alpha, Bravo and Charlie tests, as well as the CICAD I studies, Dr Krieger expresses the view that the spray mixture,

---

[676] CR, Vol. II, Annex 15: Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011.

[677] *Ibid.*, p. 4.

even under direct overspray, is at most a slight skin irritant, although some tests on rabbits disclosed no evidence of skin irritation.[678]

3.379. As Dr Krieger, notes, that conclusion is "in line with the results of prior studies on similar glyphosate formulations", in particular those formulated with POEA, which showed that they were "only slightly irritating to the skin".[679] In particular, he notes that even an occlusion test of unformulated glyphosate on humans (i.e. consisting of the application of concentrated glyphosate to the skin under gauze patches for a period of 24 hours per day for three weeks) resulted in only slight irritation, and did not cause skin sensitization, photoirritation or photosensitization.[680]

3.380. Similarly, in relation to eye irritation, again on the basis of, *inter alia*, the Alpha, Bravo, Charlie tests, and the CICAD studies, Dr Krieger noted that testing of the spray mixtures used in the spraying program, involving the direct application of the mix to the eyes of rabbits, resulted in only temporary swelling, which disappeared within seven days. Notably, where the eyes of rabbits were rinsed shortly following application, no irritation or other symptoms were detected.[681]

---

678 CR, Vol. II, Annex 15: Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 10.

679 *Ibid.*, p. 9

680 *Ibid.*, p. 9.

681 *Ibid.*, pp. 10-11.

3.381. As Dr Krieger notes, similar minor symptoms are documented in the literature in relation to reported exposure of the eye in humans, based on reports to regional poison control centres, with 21% of cases resulting in no symptoms, and 70% reporting only slight and transient symptoms in cases of direct exposure.

3.382. Although acknowledging that exposure to the spray mixture might result in "some minor and transient eye symptoms (such as redness, irritation, and watery eyes) if directly applied to the eye", Dr Krieger expresses the view that the available scientific literature does not indicate that any such symptoms would be caused in a situation in which the diluted spray mixture was sprayed aerially and the exposure resulted from drift "so that only minute amounts would reach any given location on the ground".[682]

3.383. As to the allegations made by the *Dyncorp* plaintiffs of gastrointestinal symptoms (which again parallel the allegations of the witnesses in the present case), Dr Krieger is unequivocal that the literature as to the effects of glyphosate-based herbicides is simply inconsistent with the symptoms alleged. In that regard, he notes that the only study relied upon by the plaintiffs' expert in the *Dyncorp* proceedings related to individuals who had directly ingested large amounts of concentrated formulated Roundup in an attempt to commit suicide. The dose experienced

---

[682] CR, Vol. II, Annex 15: Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 11.

by these individuals was thus very many orders of magnitude above the exposure which could be experienced as a result of drift. Nevertheless, approximately 30% of the individuals assessed in that study experienced no symptoms at all, and even at such massive exposures, the remainder suffered only minor stomach injuries.[683]

3.384. Finally, as to respiratory injuries, Dr Krieger expresses the view, on the basis of tests on rats involving prolonged forced respiratory exposure for four hour periods, that the spray mixture used in the spray program has "very low toxicity (practically non-toxic) via inhalation exposure."[684] Dr Krieger further expresses the view that under realistic conditions, similar to those alleged by the plaintiffs in the *Dyncorp* proceedings, there is little possibility for any inhalation exposure. In light of its chemical properties, glyphosate vapour will not be present in the air in any significant amounts; the average size of the droplets in the spray cloud is such that they do not remain airborne for long, but rather are deposited; and given their size, large droplets are unlikely to be inhaled into the lungs.[685]

(b) Farmyard and domesticated animals and fish

3.385. The various witnesses relied upon by Ecuador make numerous allegations as to harm to domesticated or farmyard animals, including horses, pigs, chickens and dogs, as well as

---

683 CR, Vol. II, Annex 15: Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 12.

684 *Ibid.*, p. 14.

685 *Ibid.*

fish. In the light of the scientific evidence, none of their allegations are even minimally credible.

3.386. Similar allegations were made by the witnesses in the *Dyncorp* litigation. In that regard, Professor John Giesy, a leading expert in eco-toxicology, who has significant past experience and special expertise in studying the toxicity of glyphosate, provided an expert report as to the potential effects of the spraying of glyphosate-based formulations on various animals.[686]

3.387. In his report, he focused principally on the allegations of the Mestanza family as to the harm to animals allegedly suffered, including their allegations as to the deaths of fish (including the species cachama and tilapia) as "their farm was in the closest proximity to Plan Colombia spraying operations at the time of their alleged damages compared to the rest of the test plaintiffs".[687] However, as he emphasised, his opinions "are equally applicable to the other test plaintiffs" in those proceedings.[688] They are equally applicable to the allegations of harm to animals made by Ecuador in the present case. Professor Giesy's overall conclusions were, *inter alia*,[689] that:

> "There is no scientific basis for the Mestanza plaintiffs' claims that the Plan Colombia spraying

---

686 CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011.

687 *Ibid.*, p. 3, fn. 1.

688 *Ibid.*

689 In addition, he concluded that "There is no scientific basis to opine that the herbicide mixture used in 'Plan Colombia' would be transported through soil or water or would persist in the environment." *Ibid.*, p. 4.

> operations could have caused the alleged fish kill of cachama or tilapia.
>
> There is no scientific basis for plaintiffs' claims that the Plan Colombia spraying operations could have caused the alleged deaths of farm animals."[690]

(i) Domestic and farmyard animals

3.388. The evidence of Professor Giesy, based on the scientific literature is that both unformulated Glyphosate and glyphosate formulated as Roundup are essentially non-toxic to farm animals.

3.389. As a general matter, Professor Giesy expresses the expert opinion that

> "...Glyphosate® is classified as essentially non-toxic to terrestrial (air-breathing, landbased) animals at any relevant concentrations in the environment […]"[691]

3.390. In relation to the dermal and oral toxicity of unformulated glyphosate to farm animals, on the basis of his review of the literature, Professor Giesy expressed the view that it has "low acute, oral or dermal toxicity to mammals."[692] In that regard, he observed that,

> "[t]he acute oral dose to be lethal to 50% of the individuals in a population (LD50) has been reported to be greater than 5000 mg Glyphosate® a.i per kilogram body weight ('a.i./kg bw'), and chronic effects during whole-life exposures in mice,

---

690 CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 4.

691 *Ibid.*, p. 16.

692 *Ibid.*

> rats and dogs are only observed at continuous exposures greater than 1000 mg Glyphosate® /kg […]. There was no dermal sensitization after repeated dermal exposures and no long-term inhalation studies are indicated because there was no toxicity observed in sub-chronic exposures of rats. Although most acute toxicity studies of Glyphosate® have been conducted in laboratory animals, two studies in goats have demonstrated similarly low acute toxicity in large mammals. In one acute oral toxicity study, the LD50 of Glyphosate® in goats was calculated as 3,500 mg/kg bw, and in a second, the LD50 was calculated as 5,700 mg Glyphosate® /kg bw. […] Two studies in mallard ducks (*Anas platyrhynchos*) demonstrated similarly low toxicity, with one study reporting an LD50 of 4,640 mg kg/bw and a second longer term study reporting a no-effect concentration level of 1,000 mg kg/bw for ducks fed Glyphosate® for a period of 6 months […]"[693]

3.391. Further, on the basis of a review of the available literature, Professor Giesy expressed the view that glyphosate formulated with POEA has similarly low acute toxicity to farm animals (including goats, ducks, chickens and cows). In this regard, the literature includes:

> - an acute oral toxicity study of Roundup® in goats, which reported an LD50 of 4,860 mg/kg bw,
>
> - exposure of chicks to Roundup in quantities equivalent of 6,080 mg Glyphosate® a.i./kg for 21 days resulted in

[693] CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, pp. 16-17.

no fatalities, and an exposure of 608 mg Glyphosate® a.i./kg had no statistically significant effects on growth;

- an acute oral toxicity study of Roundup® in mallard ducks reported an LD50 of 5,620 mg/kg bw,

- an acute oral toxicity study on cows, consisting of feeding Roundup to heifers by naso-gastric tube, resulted in no effect on heifers fed 400 mg/kg bw in the diet. No mortality was seen until a dose of 790 mg/kg bw dose, although the cause of death was "more likely caused by the physical volume of the Roundup® ingested than to any toxic effects of the herbicide."[694]

3.392. On the basis of that available literature as to unformulated glyphosate and Roundup formulated with POEA, Professor Giesy proceeded to estimate the dose required to cause death in various farm animals as a result of exposure to spray mixture of the type used in the PECIG. In doing so, he proceeded on the basis of a worst case scenario, assuming that "the farm animals were maximally exposed through a direct overspray and were further exposed through consumption of directly over-sprayed plant life."[695] Using an extremely conservative and protective approach, he concluded that:

> "ducks would have to be directly over-sprayed between 10,086 and 12,217 times before one would see 50% mortality";[696]

---

694 CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 17.

695 *Ibid.*, p. 18.

696 *Ibid.*, p. 19.

> "for the Plan Colombia herbicide to be lethal to a goat (or more precisely 50% of goats), the goat would need to be sprayed with the equivalent of 49,592 over-sprays";[697]

and that for cattle,

> "to be killed (or for 50% to be killed) the smaller and larger cattle would have need to have been over-sprayed with the equivalent of 21,793 and 13,621 over-sprays using the standard Plan Colombia herbicidal mixture."[698]

3.393. As for the risk deriving from consumption of contaminated grass or other fodder, Professor Giesy again took an "extremely conservative approach", assuming *inter alia* that the farm animals ate only contaminated fodder.[699] His conclusion was that in order to achieve the LD_{50} (i.e. the dosage at which 50% of the population of a given species would die), goats would have to eat 7 times their normal maximum daily consumption. For cattle, the figure was 2 to 3 times the normal daily consumption.[700]

3.394. Professor Giesy's review of the available literature is paralleled and confirmed by the opinion of Dr Krieger, who expresses the view that "there is absolutely no scientific evidence that an aerial or drift application of the Plan Colombia spray mixture could have killed any [of] the plaintiff's

---

697 CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 19.
698 *Ibid.*, p. 20.
699 *Ibid.*, p. 19.
700 *Ibid.*, pp. 19-20.

livestock."[701] In that regard, he further noted that a number of studies, based on calls to animal poison centres concerning accidental ingestion by dogs, cats, cattle, horses and sheep, show that "[e]ven accidental poisonings of domestic and farm animals with glyphosate formulations rarely cause any serious adverse health effects",[702] and that no deaths of animals were reported.

3.395. The same conclusions were arrived at in the acute toxicity studies on the spray mixtures Alpha, Bravo and Charlie, ordered by the Department of State and reviewed by the EPA.[703]

(ii) Fish

3.396. In reaching his conclusions, noted above, as to the impossibility of the fish-kills of cachama and tilapia alleged by the Mestanza family in the *Dyncorp* proceedings (as to which similar allegations by Victor Mestanza were relied upon by Ecuador in the *Memorial*, although they are notably absent from the *Rejoinder*),[704] Professor Giesy considered the existing scientific literature as to the toxicity of the spray mixture to the relevant species of fish, including in particular the observed LC_{50} concentrations (i.e. the concentration of the spray mixture which will cause a 50% mortality rate) for both glyphosate alone, and formulated Roundup.

---

701 CR, Vol. II, Annex 15: Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 14.

702 *Ibid.*, p. 15.

703 Para. 2.41, above. See also, CR, Vol. V, Annexes 56 A-C.

704 Letter from Victor Mestanza to Roger Mera, Regional Chief Sucumbíos-Orellana, Ministry of the Environment (14 Oct. 2002), p. 1. EM, Vol. IV, Annex 237; EM, para. 6.68.

3.397. He then again took an extremely conservative approach in assessing the hazard quotient[705] and assumed direct overflight of the relevant fishponds, rather than deposition due to drift, and that the entirety of the spray mixture at the normal application rate used in the PECIG program was deposited on the surface of the water.

3.398. Even on this extremely conservative "worst case" scenario, his finding in relation to cachama was that,

> "...the LC50 concentration of Roundup® is 264 times greater than the worst-case concentration of Roundup® predicted to occur in the fish pond due to a direct over-spray, even assuming no dissipation, degradation or sequestration of any of the constituents of the Plan Colombia herbicidal formulation."[706]

3.399. Further, even using a lower LC_{50} figure suggested by some of the literature, he concluded that there would have be at least 63 direct over-sprays to cause acute lethality of half of the cachama.[707]

3.400. Although, as Professor Giesy observes, the literature indicates that tilapia are slightly more sensitive than cachama (with juveniles being more sensitive than adults),[708] a similar conclusion was reached. Professor Giesy concluded that at least 45.5 direct over-sprays would be necessary in order to reach the

---

705 CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 9.

706 *Ibid.*, p. 15.

707 *Ibid.*

708 *Ibid.*, p. 13.

LC_{50} for juvenile tilapia, and 100 direct oversprays for adult tilapia. Even using the lowest LC_{50} suggested in the literature for tilapia, his assessment was that at least 20 direct oversprays of the ponds would be necessary in order to result in mortality.

(c) Amphibians

3.401. Finally, a brief word should be said as to the alleged particularly deleterious effects of the spray mixture on amphibians.

3.402. The suggestion made by Ecuador that amphibians are particularly sensitive to chemicals is flawed; as highlighted by Dr Solomon, recent research shows that amphibians in this regard "are, in fact, less sensitive that some other aquatic species",[709] although they may be particularly sensitive to other factors, including disease and change of habitat resulting from other activities of humans. As Dr Solomon explains, given the lack of toxicologically significant exposures, any effects on amphibians in Ecuador would be negligible.[710]

(5) GIVEN THE LOCATION AND MANNER IN WHICH IT WAS SPRAYED, THE SPRAY MIXTURE COULD NOT HAVE CAUSED THE HARMS ALLEGED TO PLANTS

3.403. Finally, the scientific evidence unequivocally shows that the various allegations of widespread harm to plants cannot be true. As noted above, Ecuador has produced no hard evidence of these supposed effects, whether in the form of contemporaneous

---

709 CR, Vol. II, Annex 3: Solomon Report (2011), para. 33.

710 *Ibid.*, para. 32.

photo evidence of the supposedly widespread devastation, the results of the analysis of samples of soil or crops showing the effects of exposure to the spray mixture, or expert reports of investigative or monitoring missions.

3.404. Of course, any such evidence would only be of value to the extent that it was certain that the relevant areas and plants to which it related had in fact been exposed to drift. As set out in Section E below, there are a number of alternative potential causes for many of the effects attributed to the spraying, and as such, the certainty that there had in fact been exposure to the spray mixture is a *sine qua non* of attributing any probative weight to evidence of symptoms observed in plants.

3.405. However, given that, when assessed in the light of the spray data, the credibility of the various allegations by the witnesses and other individuals whose claims are reported in the secondary material that they in fact witnessed spraying is seriously undermined, none of the allegations of those individuals as to the supposed effects upon plants within Ecuador concern situations in which it is clearly proved that the plants in question had been exposed to the spray mixture as the result of drift. As such, their allegations that harm to plants was observed are necessarily likewise undermined, and lack any probative value.

3.406. Put shortly, if there was no spraying nearby, as alleged, such that there could have been no exposure to the spray mixture resulting from drift, the claims as to the effects upon plants

observed (even if taken at face value) prove nothing, except perhaps that other sources of plant morbidity are at work in the border region.

3.407. In any case, Dr Hewitt's modeling of even the spray events nearest to the border shows that deposition downwind of the location of spraying quickly drops off even a short distance from the spray swath. As a result, even for these spray lines which occurred closest to the border, the amounts of deposition of spray mixture within Ecuadorian territory due to drift was virtually non-existent, and in any case, well below the relevant levels of concern for plants.

3.408. In this regard, the range of levels of concern for plants suggested in the CICAD studies (the lowest value for which is 36g/ha), which draws on a wide variety of studies as to the toxicity of the ingredients of the spray mixture, are, in and of themselves, designed to be protective of plants in the border region.[711] Yet, as modeled by Dr Hewitt, the deposition due to drift resulting from even the closest spray lines is orders of magnitude below even those conservative thresholds. Indeed, in the vast majority of the spray lines modeled, the amount of deposition at the Ecuadorian river bank due to drift even from those worst-case scenarios, is well below even the extremely cautious level of concern (4.1g/ha) suggested by Dr Weller. As such, the assertion that widespread harm could have been caused to vast swathes of plants within Ecuador, including at locations

[711] CR, Vol. II, Annex 4: Dobson Report (2011), paras. 39 and 40.

located at substantial distances from the river, simply does not withstand scrutiny.

3.409. In any case, the very low level of concern suggested by Dr Weller has no firm basis in the scientific literature. Rather, as Dr Dobson explains,[712] the paper on which Weller particularly relies in suggesting a lower level of concern (Boutin *et al*. 2004) was concerned to arrive at a value which was massively protective of the early-growth stages of species in margins next to crop fields which are directly over-sprayed. Such a hugely protective value ignores the other data as to toxicity of the components of the spray mixture,[713] and does not accord with accepted methods for risk assessment.[714] As such, it is not generalisable, and does not justify any adjustment to the level of concern suggested by the CICAD studies. Further, the suggestion by Weller that species in Ecuador may be more sensitive to the spray mixture is unsupported by any empirical evidence.[715]

3.410. The analysis by Dr Evans of available satellite imagery likewise corroborates the lack of any effects within Ecuador. In that regard, although the satellite imagery clearly shows changes in vegetative cover within Colombian territory, which very closely correspond to the locations in which spraying took place,

712 CR, Vol. II, Annex 4: Dobson Report (2011), para. 7.
713 *Ibid.*
714 *Ibid.*, para. 9.
715 *Ibid.*, para. 10.

no such changes in vegetative cover are visible within Ecuador.[716]

3.411. As such, none of the allegations of harm to plants upon which Ecuador relies are even remotely credible.

E. Overall Appreciation of Ecuador's Case on Harm

(1) ALLEGATIONS VERSUS EVIDENCE

3.412. In the statements of the witnesses on which Ecuador principally relies, there is a whole catalogue of allegations of harm, supposedly caused by the spraying within Colombia. Those allegations relate to alleged effects on human health, alleged damage to plants (including both food crops and wild vegetation), and alleged effects on animals (both domesticated farm animals and wild animals).

3.413. In assessing the statements of the witnesses (and the similar claims of individuals reported in media press reports and other contemporaneous documentation), it is necessary to distinguish between on the one hand, bare, unsubstantiated allegations of harm, and on the other, independent, objective evidence demonstrating that harm did in fact occur as alleged which Ecuador has failed to provide, either with its *Memorial* or in the *Reply*. It is suggested that the Court should be slow to accept the allegations of witnesses, or reports unsupported by other contemporaneous evidence, that the effects alleged in fact

[716] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 1.1-1.5, 3.38, 3.51, 3.69 and 3.77.

occurred, and particularly so when key allegations are demonstrably false.

3.414. In this regard, the burden of proof in showing that harm occurred lies on Ecuador as the party making the allegations. Further, even if it were established that the various harms did occur as alleged – *quod non* –, it is for Ecuador to prove that the symptoms and effects which the witnesses say that they witnessed were in fact caused by deposition of spray mixture within Ecuador as the result of drift from spraying within Colombian territory.

3.415. In its *Reply*, Ecuador in Chapter 4 sets out the harms alleged by the witnesses and the supposedly supporting evidence contained in other contemporaneous documents, and seeks to show that the various allegations of harm allegedly caused by spraying are corroborated by the data as to the times and locations of spray events obtained from the US Department of State. Thereafter, in Chapter 5, in setting out its allegations as to violation of human rights and the rights of indigenous peoples, Ecuador effectively doubles-up, substantially repeating the same allegations of the witnesses as to the supposed harm to health and property allegedly due to spraying.

3.416. As shown in Section C (3) above, despite Ecuador's best efforts, the spray data on its own in fact substantially falsifies the various assertions that harm was or could have been caused by spraying – the data in fact shows that such spraying as occurred within Colombia in the regions adjacent to those within

Ecuador in which it is alleged that harm was suffered was at such a distance that, consistent with the scientific evidence as to modeling of drift, and the amount of deposition necessary in order for any effects to be felt, the harms alleged could not possibly have been caused by spraying. Even in those few cases in which there was some spraying within Colombian territory close to the locations at which the witnesses allege they were present, the modeling of the closest individual spray lines shows that the quantities of spray mixture that could have reached even the closest point on the Ecuadorian bank of the river, let alone the location where the witnesses were located, were so small that it could not have caused the harms alleged.

3.417. Further, as shown in Section C above, given the distances from the nearest spray events, the allegations of many of the witnesses (and of the individuals quoted in the press and NGO reports) as to having been directly oversprayed by spray planes are all undoubtedly and demonstrably false.

3.418. Quite apart from this, as set out in Section D above, the overwhelming weight of scientific evidence conclusively shows that the allegations of the witnesses cannot be true:

(a) even as a result of direct overspray, let alone incidental exposure due to drift, the spray mixture is incapable of causing the catalogue of harms to human health alleged; even if one of the less serious symptoms allegedly suffered, minor and transient irritation to the eyes, is theoretically

consistent with direct exposure to the spray mixture, the potential exposure due to drift is well below that which could conceivably result in such minor symptoms. In any case, the claims of each of the witnesses must be discounted as a whole insofar as their other allegations, including as to other, more serious symptoms, up to and including death, are clearly false;

(b) the allegations of damage to farm animals are likewise demonstrably untrue; the scientific evidence is clear that even exposure to large quantities of the spray mixture, far exceeding that resulting from direct overspray, or from consumption of large quantities of directly oversprayed fodder, is incapable of causing deaths of domesticated animals (chickens, cows, goats and horses) as alleged by the witnesses. If, as results clearly from the evidence of Professor Giesy discussed above, even direct overspray ten or twenty times in close succession is incapable of causing the death of farm animals,[717] it is inconceivable that deposition of minute quantities of spray mixture as the result of drift (to the extent that any spray mixture at all could have reached the relevant locations), could have

[717] CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, pp. 5, 15, 16, 18.

resulted in the decimation of the animal population of the farms of the witnesses in the manner alleged by them;

(c) finally, as to the alleged damage to plant life, the scientific evidence as to the amounts of the spray mixture necessary in order to result in damage to various plants found in the border region, including crop species, combined with the evidence as to likely deposition rates even from those spray events closest to the border shows that the spray mixture could not have reached Ecuador in quantities such as to cause the harm alleged. Further, the evidence of many of the witnesses as to the speed with which harm is alleged to have occurred after spraying, and the manner in which it manifested itself is simply not consistent with the evidence as to how glyphosate functions as a herbicide. In that connection, insofar as some of the witnesses do give details of the damage to plants allegedly observed, many of the symptoms alleged (black spotting of leaves, rotting of fruit, etc), are inconsistent with the biological effects of glyphosate, and, as discussed in the following section rather are consistent with other pathologies, such as the effect of fungi, or are attributable to the poor soils in the Amazon region.

(2) THE ISSUE OF CAUSATION

3.419. The issue of causation has already been touched upon. Not only must Ecuador demonstrate to the satisfaction of the Court that the harms it alleges did in fact occur, but it must also show that if there was harm, it was caused by deposition of the spray mixture as a result of drift from spraying within Colombia.

3.420. As to the latter question, the burden of proof is likewise upon Ecuador to show clearly not only that the harms alleged occurred, but also that there was exposure to the spray mixture, and that that exposure was the cause of the harm.

3.421. It is not for Colombia to prove one negative, still less two, or even three.

3.422. Nevertheless, there are multiple other factors which account for a large number of the symptoms alleged, notwithstanding the evident tendency of those in the border region to attribute all of their woes to spraying (and this whether or not any spraying in fact took place anywhere near where they resided).

3.423. In its *Counter-Memorial*, Colombia drew attention to the fact that a variety of other factors could be the cause of the various damages attributed by the inhabitants of the border region to the aerial spraying, including *inter alia*, widespread poverty (resulting in malnutrition and high child mortality rates), poor or inexistent infrastructure (including in particular a lack of

clean running water and sewage treatment facilities) and other noxious activities in the border areas.[718]

3.424. Colombia does not discuss again all of that evidence here, but merely points to the most significant evidence, as well as additional material which clearly shows that all of the harms allegedly suffered are consistent with a variety of other causes.

3.425. Ecuador itself admits the "remoteness, poverty and underdevelopment" of the region,[719] and adopts Colombia's position that the border population in northern Ecuador "live in precarious hygienic conditions and only have limited access to medical facilities".[720]

3.426. Insofar as the witnesses allege that the spraying resulted in diarrhea and other gastro-intestinal/digestive disorders, such conditions are notoriously associated with areas characterized by poverty, inadequate sanitation and health conditions, lack of potable water, such as the border regions of Ecuador.

3.427. In the *Counter-Memorial*, Colombia made reference to a 2007 publication by the Ecuadorian Ministry of Public Health, which listed such causes as being among the principal causes of

---

[718] CCM, paras. 2.1-2.35; see also, CR, Vol. VI, Annex 65: Pineda-Medina, Juan and Naizot, Anne-Lise/ FLACSO-Ecuador, *Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño,* pp. 136-137, 140-141, 149, 155, 167-168, 195-220.

[719] ER, para. 3.43.

[720] ER, para. 3.43, quoting CCM, para. 7.37.

disease in the border provinces of Ecuador.[721] That precisely such conditions exist and are prevalent in the border regions of Ecuador, and that such symptoms are extremely widespread is further clearly borne out by the conclusions of the thorough study published in 2009 conducted jointly by Ecuador and Colombia, "Analysis of the Health Situation on the Borders (ASIS [from its Spanish acronym]) Andean and Pacific Nariño/Tulcán-San Lorenzo Corridors (Colombia –Ecuador)" (*Análisis de Situación de Salud de Fronteras (ASIS) Corredores andino y pacífico Nariño / Tulcán – San Lorenzo, (Colombia-Ecuador)*.[722]

3.428. In that regard, having noted that "[i]t is known that diseases are linked to low education levels and poverty,"[723] the report notes that "[d]ata for poverty indicate that 65,6% of the population of the border corridor lives in poverty and 26,9% in extreme poverty".[724] As to the most common and prevalent diseases in the border corridor, as evidenced by medical consultations, the ASIS report recorded that:

---

721 CCM, Vol. II, Annex 92: "Ten Main Morbidity Causes per Province", Public Health Ministry of Ecuador, Epidemiology Sub-process, Quito, 2007.

722 CR, Vol. VI, Annex 64: Organismo Andino de Salud, Hipolito Hunanue Agreement, *Analysis of Health Situation in the Border, Pacific/Andean Corridors Nariño/Tulcán - San Lorenzo (Colombia - Ecuador)* 2009, First Edition 2010. The following Ecuadorian agencies took part in that Study: Ministerio de Salud Pública, Dirección de Control y Mejoramiento de la Salud Pública, Subproceso de Epidemiología, Subproceso de Cooperación Nacional e Internacional, Dirección Provincial de Salud del Carchi, Dirección Provincial de Salud del Esmeraldas. Also involved were: The PAHO Offices in Colombia and Ecuador, the Corporación Andina de Fomento, The ART/UNDP Program in Ecuador and the Organismo Andino de Salud - Convenio Hipólito Hunanue.

723 *Ibid.,* p. 49.

724 *Ibid.*, p. 63.

> "Intestinal parasitosis ranks first with 43.1 per 1000 inhabitants in the total for out-patient consultation on the frontier corridor. The second cause was primary hypertension, at a rate of 27.3 per 1000 inhabitants.
>
> There is a predominance of infectious diseases which are the main cause of death in the corridor, together representing 138.4 per 1000 inhabitants, with a predominance of parasitosis (41.3 per 1000 inhabitants), urinary tract infections (26.7), acute non-specific infection of the respiratory tract (26), infectious origin diarrhea and gastroenteritis (25.5), acute rhinopharyngitis (17.7), acute tonsillitis (8.3)), pneumonia (7.6), acute bronchitis (6.9) and bacterial intestinal infections (4.4).
>
> The diseases of the gastrointestinal tract – chronic gastritis (10.2), non-specific gastritis (5.3) are also major causes of the demand for health services in the corridor."[725]

3.429. Further, Colombia in its *Counter-Memorial* also made reference to the Public Health Surveillance System of Intoxications due to Pesticides, instituted by Ecuador in 2007 pursuant to a bilateral technical and scientific cooperation agreement between Colombia and Ecuador, and jointly financed by the two States as well as PAHO and the WHO.[726] Although Colombia drew attention to the fact that Ecuador had made no mention of this initiative, significantly, in its *Reply*, Ecuador again chose to ignore entirely the program and its findings.

---

[725] CR, Vol. VI, Annex 64: Organismo Andino de Salud, Hipolito Hunanue Agreement, *Analysis of Health Situation in the Border, Pacific/Andean Corridors Nariño/Tulcán - San Lorenzo (Colombia - Ecuador)*, 2009, pp. 68-69.

[726] CCM, para. 2.38

3.430. That there exist other factors which could cause the health symptoms complained of by the witnesses is further confirmed by the publicly available expert evidence filed in the *Arias v. Dyncorp* proceedings before the United States District Court for the District of Colombia.

3.431. In particular, the expert report of Professor Smalligan, a medical doctor and public health specialist, who practised for some 8.5 years in a rural hospital in Ecuador, provides further confirmation, if any were needed, of the presence of a high background incidence of various diseases in the border regions in Ecuador, which he attributes, *inter alia*, to the tropical environment, poverty, the lack of basic amenities (including clean water, indoor plumbing, adequate housing and public sanitation infrastructure), as well as the widespread incidence of unhealthy diet and the unavailability of adequate medical care.[727]

3.432. In addition, as Dr Smalligan explains, many of the symptoms complained of by the individual plaintiffs in the *Dyncorp* proceedings are attributable to diseases or conditions endemic to the rural border areas, and attributable to one or more of these causes. In particular gastrointestinal problems (including diarrhea, stomach upset, nausea and vomiting), are "exceedingly common throughout rural Ecuador and can be directly attributed to the lack of sanitation and clean drinking

[727] CR, Vol. II, Annex 13: Expert Report of R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p.5.

water, the close proximity of humans to livestock, and the heavy insect and rodent populations".[728] In this regard, Dr Smalligan notes that the public health literature has recorded rates of infection with intestinal parasites approaching 100% of the population.[729]

3.433. Similarly, skin diseases, including recurrent rashes, itching, irritation and infections are widespread; due to "the lack of clean water, indoor plumbing and adequate sewage treatment and disposal, combined with the fact that many people live with dirt or wooden floors, the opportunity for skin infections is everpresent".[730] As Dr Smalligan explains:

> "There is also a lack of first aid materials and knowledge of how to clean and dress fresh wounds by the lay public. All of these factors contribute to the frequency with which we would see Staphylococcal and Streptococcal skin infections among our patients. Insect bites occur daily to most people due to the homes lacking glass windows or screens. Scratching of these insect bites with dirty fingernails and hands are a common method of contamination with these organisms which cause characteristic skin lesions, namely impetigo, pyodermatitis, furuncles and carbuncles (or small abscesses). These lesions are quite characteristic and are usually diagnosed and treated clinically. The next most common recurrent rash is scabies which is caused by a microscopic mite and causes intense itching which can then become secondarily infected with the Staph or Strep mentioned above. Due to the humid conditions one also frequently encounters

728 CR, Vol. II, Annex 13: Expert Report of Dr R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p.7.

729 *Ibid.*

730 *Ibid.*, p. 8.

> chronic fungal infections in patients ranging from Candida in baby diaper regions to "ringworm" caused by Tinea species and Tinea versicolor which causes a hypopigmentation of the skin in many dark-skinned patients. Botfly myiasis is another common condition, characterized by an itchy, weeping wound that appears to be an infected insect bite from which one can extract the larvae (maggot) of a fly. […] Certain parasites can also cause itchy skin lesions as well, such as Strongyloides. Contact dermatitis can also occur after exposure to certain tropical plants (equivalent to poison oak in the USA), and allergy to metals or other materials."[731]

3.434. Similarly, widespread respiratory problems are attributable to the widespread use of smoke from fires within homes, in order to keep away insects.[732] There is also a high incidence of other diseases, including

> "viral upper respiratory infections (URI, or common cold and/or influenza), bronchitis, pneumonia, asthma, bronchiolitis, tuberculosis, Loeffler's syndrome (a condition that occurs with wheezing, eosinophils in the bloodstream and infiltrates on x-ray that appears as certain parasites migrate through the lungs), pertussis and paragonamiasis."[733]

3.435. The population of the border region also suffers from general eye problems, due to the tropical location, which results in chronic exposure to ultraviolet light, and from insect-born diseases; in addition, conjunctivitis (whether viral, allergic or

---

731 CR, Vol. II, Annex 13: Expert Report of Dr R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p.8.

732 *Ibid.,* p. 8.

733 *Ibid.,* p. 9.

bacterial) is also present, as are a variety of other eye conditions.[734]

3.436. As such, the various health conditions complained of by the witnesses are potentially attributable to a number of other possible causes, none of which have anything to do with the spraying in Colombia.

3.437. There are also a variety of other potential causes of the other harms alleged by the Ecuadorian witnesses.

3.438. As regards the alleged harms to crops, plant diseases are prevalent in tropical environments.[735] They are particularly widespread in the border regions of Ecuador due to, inter alia, the poor quality of the soil and the fact that generally accepted agricultural techniques, including crop rotation, the use of fertilizers and where appropriate, the use of pesticides, are generally not followed.[736]

3.439. Further, more generally, there are other external causes operative in the border regions which result in general degradation of the environment. In particular, a study carried out

---

[734] CR, Vol. II, Annex 13: Expert Report of Dr R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 9.

[735] CR, Vol. II, Annex 14: Expert Report of Dr R.C. Ploetz, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p.2.

[736] CR, Vol. II, Annex 11: Expert Report of Dr A. Atalay, Ph.D., CPSS, prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, pp. 4-7. See also the results of the tests conducted in early 2004 on soil samples taken from Puerto Mestanza, which identified numerous problems with the soil, including a lack of nutrients, acidity and iron and aluminium toxicity, an excess of potassium, and deficiencies in zinc and boron, CR, Vol. IV, Annex 44 (Soil Samples).

for UNDP, to which Colombia made reference in the *Counter-Memorial*, identified a number of causes for the loss of biodiversity and environmental degradation in the province of Esmeraldas.[737]

3.440. In this regard, the Awá territory, located in Esmeraldas, is particularly at risk from a number of threats; a report by FLACSO - Ecuador, having assessed the situation in the Awá territory, identified three principal threats to the Awá, in particular, the expansion of the African Palm Oil industry; mining; and the activities of forestry companies. In this regard, the report found that African Palm Oil plantations are a source of contamination of watercourses, whether through run-off of pesticides and fertilizers used on the plantations, or through direct discharge of pesticides by plantation workers.[738] Strikingly, the symptoms reported as a result of this contamination include many of the same symptoms as are alleged to have been caused by the spraying in Colombia, including intestinal infections, skin irritation, headaches, and

---

[737] Report of the Consulting Project ECU/99/017/UNDP, Diagnosis of the current situation of the Choco ecoregion in the Esmeraldas Province: Direct causes, authors and underlying causes of the loss of biodiversity and degradation of environmental biodiversity, Quito, 27 May 2005, p. 51. Available at: http://www.bibliotecaonu.org.ec/files/Diagnostico%20de%20la%20situacion%20actual%20Choco...ambiental.pdf (Last visited 10 March 2010).

[738] CR, Vol. VI, Annex 65: Pineda-Medina, Juan and Naizot, Anne-Lise/ FLACSO-Ecuador, *Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño,* pp. 169-173.

vomiting.[739] Similarly, logging, quite apart from resulting in deforestation, causes widespread pollution and other environmental damage.

3.441. As such, it is clear that all of the effects allegedly suffered by the witnesses, including in particular the various health effects which they claim to have experienced as a result of spraying within Colombia, to the extent that they did in fact occur, have a variety of other potential causes. Many of the potential alternative causes of the health symptoms allegedly experienced by the witness are endemic in the border region. Further, and in any case, in the light of the scientific evidence that the spray mixture is incapable of causing harms of the types alleged, and that if any deposition due to drift did occur, the quantities deposited did not exceed insignificant, *de minimis* quantities, the allegations of the witnesses that the harms they claim to have suffered (if such harms did in fact occur) were caused by spraying must be dismissed as being without any basis.

(3) PUERTO MESTANZA

3.442. The fatuity and falsity of Ecuador's case on harm is nowhere better illustrated that by taking the crowning glory of harm in the *Memorial* – otherwise known as the "Catastrophe of Puerto Mestanza". It is indeed a catastrophe – for Ecuador.

---

[739] CR, Vol. VI, Annex 65: *Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño*, pp. 199-200.

3.443. In the *Memorial*, the allegations of Mr Mestanza were put forward as conclusive proof of the supposedly devastating harm suffered within Ecuadorian territory; Ecuador first recounted, based on the assertions of Mr Mestanza, how,

> "Over the course of twenty years, the Mestanza farm had expanded from cultivating plantain, maize, rice and various fruits to include raising pigs, ducks and farm-raised fish. The farm's crops consisted of eight hectares of *panela* sugarcane, 30 hectares of golden plantain, as well as short-cycle crops including maize, rice and fruits. Thanks to a large capital investment, 18 fish pools were constructed to farm-raise 120,000 tilapia."[740]

3.444. As a result of the alleged effects of the spraying, Ecuador alleged that:

> "The impressive success of Mr. Mestanza's farm was brought to an end when the first fumigation planes arrived in November 2000."[741]

3.445. It relied extensively on the allegations of Mr Mestanza, including as to the "destruction" of his fish ponds, as proof of the damage supposedly caused by the spraying:

> "Due to the devastation to [sic] of its animals and crops, the Mestanza farm today consists of a few barely productive fields."[742]

3.446. By contrast, what is said of the claim of Mr Mestanza in the *Reply*? Nothing! Mr Mestanza has been disappeared.

---

740 EM, para. 6.67.
741 EM, para. 6.68.
742 EM, para. 6.95; see also EM, para. 6.92.

3.447. And this is all the more significant in that the claim was particularized and it was dated. It could be tested. Unusually among the other evidence put forward by Ecuador, in his letter dated 14 October 2002 to the Ecuadorian authorities, Mr Mestanza made allegations of spraying relating to specific months and even specific dates, and alleged particularly serious harm to his business operations:

> "In the fumigations of November 2000, I lost 30,000 fish as a direct effect of the chemical compound used in the fumigations, all dead, 4 hectares of plantain, 2 of yucca and farmyard animals. On the second occasion of the sprayings, conducted in early January 2002, in which spraying planes flew for three consecutively days over the pools, I was affected by the death of 60,000 fish, 10 hectares of maize and the partial death of 6 hectares of sugarcane, and the total loss of the fruit of a citrus plantation. The third time, which began in early September of this year, I had a huge financial loss, as I lost 400 ducks and 80,000 fish, the pigs were sick, and the humans fell ill with itchiness, throat infections, diarrhea and headaches. The fourth time was Monday 7th and Thursday 10th of October of this year, when the spraying planes flew over my property again. There is clear evidence of the death of woodlands, *orito* and sugarcane; that is practically liquidating my project..."[743]

3.448. As Colombia pointed out in the *Counter-Memorial*, Mr Mestanza and seven members of his family were plaintiffs in the *Arias v. Dyncorp* proceedings.[744] It emerged during the taking of depositions in those proceedings that 5 members of the

---

[743] EM, Vol. IV, Annex 237.

[744] CCM, Vol. I, para. 1.37.

family who had made claims of personal injury in sworn statements had in fact not been resident at Puerto Mestanza at the relevant times; as a consequence, their statements were withdrawn, and the claims of three of the members of the family were dismissed with prejudice.[745] The claim by Mr Mestanza himself in the *Dyncorp* proceedings continued.

3.449. In his letter of 14 October 2002, Mr Mestanza alleges that the occurrence of spraying caused him significant losses in specific periods:

- November 2000 (allegedly causing the loss of 30,000 fish; a total of 6 hectares of crops, and farmyard animals);
- January 2002 (as to which he alleged direct overspraying on three consecutive days, the loss of 60,000 fish, and damage to crops);
- early September 2002 (the loss of, inter alia, 400 ducks and 80,000 fish);
- 7 and 10 October 2002 (alleged death of woodlands, *orito* and sugarcane).

3.450. Even the most cursory comparison of those allegations with the spray data reveals that they are, at least in substantial part, unequivocally false. In particular, there was no spraying anywhere near Puerto Mestanza (nor anywhere else in Putumayo) in November 2000, and the spray events in

[745] CCM, Vol. I, para. 1.37.

December 2000 took place either 20 km to the west, in the region of Salinas, or over 50 km to the west. Nor was there any spraying in November 2001.

3.451. On this basis alone, Ecuador's claim made in the *Memorial* that the "impressive success of Mr. Mestanza's farm was brought to an end when the first fumigation planes arrived in November 2000"[746] is clearly without any foundation.

3.452. Similarly, the spray data shows clearly that there was no "direct overspraying" of Puerto Mestanza in January 2002 (or indeed at any time). Although there was some spraying in the general region of this part of the border in early 2002, it was at a considerable distance from the border and *a fortiori* from the Mestanza farm. As to the spraying within Colombia in the region in September and October 2002, detailed analysis of satellite imagery was carried out by Dr Evans,[747] and Dr Hewitt modeled the projected deposition as a result of drift from the lines closest to the Mestanza farm.[748]. Their conclusions demonstrate that Mr Mestanza could not have suffered the harm alleged by him.

3.453. Dr Evans concludes, on the basis of his analysis of the satellite imagery from before, during and after the relevant

---

[746] EM, Vol. I, para. 6.68.

[747] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.13-3.38.

[748] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 1 (10 Oct. 2002), 12 (7 Oct. 2002), 20 (8 Sep. 2002) and 62 (7 Jan. 2002). See also CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 3.21.

spraying, and comparison with the actual location of the spray events which took place in September and October 2002, that,

> "while significant changes in vegetation cover and condition may be observed in the Republic of Colombia in 2002 to 2003 near the Mestanza farm at Puerto Mestanza – some of which changes are clearly due to the PECIG spraying that took place in Colombia during 2002 – there are no similar changes reflected on the Ecuadorian side of the border on the Mestanza farm or in the surrounding area."[749]

3.454. That conclusion is corroborated by Dr Hewitt's modeling of the deposition rates from the nearest spray lines to Puerto Mestanza in January, September and October 2002:

- as to the closest spray line to Puerto Mestanza, in January 2002, which was sprayed on 7 January 2002 and was at a distance of approximately 198m from the nearest point on the Ecuadorian bank of the river, the resulting deposition at the river bank, was only 0.055 g/ha;
- the closest spray line in early September 2002, which was sprayed on 8 September 2002, and occurred at a distance of approximately 1.7 km from the nearest point on the Ecuadorian bank of the river, resulted in a projected deposition level at the river bank in Ecuador of 0.6537 g/ha; and

[749] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 1.2.

- the two closest spray lines in October 2002, which were sprayed on 7 and 10 October 2002, respectively, at distances of 891m and 570m from the nearest point on the Ecuadorian bank of the river, resulted in projected deposition levels of, in the first case, 1.15 g/ha and in the second, 2.71 g/ha.

3.455. As Colombia has already noted, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha. The level of concern for various crops ranges between 36-1,958 g/ha. Even the excessively cautious value of 4.1 g/hg suggested by Ecuador's expert, Dr Weller, was not exceeded by the closest spraying events. Of course, the deposition levels calculated by Dr Hewitt are, in any case, for the closest point to the spray event on the Ecuadorian river bank; to the extent that Mr Mestanza's farm was further away, the level of deposition would have been even less.

3.456. The Mestanza claim, like those of all of its vaguer counterparts, is straightforwardly false. Indeed it is fraudulent and opportunistic. That this is so is eloquently demonstrated by the views of a number of scientific experts in their reports filed in the *Dyncorp* proceedings in support of the motion by the defendant requesting that the US trial court summarily dismiss the claims without proceeding to a full trial:

(a) As to the allegations of injury to health made by Mr Mestanza and members of this family in the *Dyncorp* proceedings, the report of Dr Smalligan,

records the shifting and inherently unreliable nature of their allegations:

> "The family members' claims are all based on self-reporting; there are no relevant medical records, medical history, or laboratory tests that could support a reliable diagnosis. The need to rely on the family's self-reporting is particularly problematic because the family has admitted that some of the ailments that they had at one time attributed to the spraying did not in fact occur. For example, 42-year-old son Edy Mestanza's Questionnaire claimed that he saw spray planes, described the spray operations in detail, and alleged that he experienced various symptoms from the spraying. He admitted at his deposition, however, that he was never at the farm during the spraying and suffered no physical injuries because of it. The Mestanza family likewise had previously alleged that the Plan Colombia herbicide had caused various injuries to three other family members who they subsequently conceded also were hundreds of miles away from the location of the alleged spraying (at the family's principal home in Guayaquil) and who suffered none of the alleged symptoms […]. For those family members who still allege that they were physically injured, the allegations of physical

> injury are inconsistent and have changed over time."[750]

(b) In addition, Dr Smalligan records that, some 10 months after he had been seen by his doctor Mr Mestanza persuaded him to sign a "certification", prepared by Mr Mestanza himself, which purported to attribute various symptoms to the alleged spraying.[751]

(c) Finally, and in any case, Dr Smalligan opines that all of the various symptoms alleged by Mr Mestanza, (including bacterial or fungal skin infections, chronic dermatitis, chronic gastritis, etc) to have been caused by the spraying,

> "are commonly seen in Northern Ecuador as a result of endemic health problems that have nothing to do with any alleged toxic exposure. Indeed, many of his health complaints could not occur as a result of a chemical exposure."[752]

(d) As noted above, Professor Giesy, an expert in toxicology, is supremely dismissive of the claims made by Mr Mestanza as to the deaths of both fish and animals, expressing the view that there is "no scientific basis" for the claims of

---

750 CR, Vol. II, Annex 13: Expert Report of Dr R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, p. 23.

751 *Ibid.*, p.25.

752 *Ibid.*

Mr Mestanza that exposure to the spray mixture could have caused the death of his fish, nor for the claims of Mr Mestanza and the other test plaintiffs as to the alleged death of farm animals.[753] The basis for his conclusion in both regards is that it is scientifically "impossible"[754] that exposure to the spray mixture could have resulted in the effects alleged.

(e) Dr DiTomaso, a specialist in weed science assessed the claims of Mr Mestanza, his deposition testimony and a video shot on his farm in November 2002 (i.e. one month after the spraying in early October 2002), opines that:

> "The video shot in November 2002 – i.e., one month after the October 7th and 10th spray events that Mr. Mestanza claims supposedly devastated his "project" – shows time and again that the Plan Colombia spray missions could not have affected his property as the family claims. Most significantly, every segment of this video demonstrates the lack of damage to the vegetation surrounding the specimens that Mr. Mestanza selected to display and discuss in front of the camera. Because Glyphosate is a non-selective herbicide, if it reached the Mestanza property by a direct aerial

[753] CR, Vol. II, Annex 12: Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011, p. 4.
[754] *Ibid.*, pp. 16, 20, 21.

> application or by drift from an application in neighboring Colombia, it would be impossible for the effects of glyphosate to be observed only in isolated plants (or portions of plants). Rather, wide swaths of the Mestanza property would show the effects of the application, and so it is quite telling that this obviously is not the case."[755]

Dr DiTomaso then goes on to discuss the numerous additional factors apparent from the video which demonstrate that the various damages alleged are inconsistent with exposure to the spray mixture.[756] The entire discussion invites careful study, as the variety of damage to plants (including, e.g. black spotting) attributed by Mr Mestanza to exposure to the plants closely parallels those of various of the witnesses in these proceedings. However, as Dr DiTomaso explains, none of those symptoms are consistent with exposure to glyphosate.[757]

F. Conclusion

3.457. In summary, Ecuador has not discharged its burden of proof in showing that the spray mixture has been deposited within its territory, that any of the damage alleged has in fact

---

[755] CR, Vol. II, Annex 9: Expert Report of Dr J.M. DiTomaso, Ph.D. prepared for the Dyncorp Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011, pp. 30-31.

[756] *Ibid.*, pp. 31-33.

[757] *Ibid.*, p. 31.

been caused or that any of the effects which it asserts have occurred are in fact caused by the spraying.

3.458. Ecuador has put forward no hard evidence that *any* damage has been caused or that any significant quantity of the spray mixture has been deposited within its territory. Indeed, the results of such contemporaneous scientific tests as are available before the Court show that no trace of the spray mixture was detectable in soil and water samples taken within Ecuadorian territory.

3.459. The modeling of drift shows that, in fact, even those events closest to the border, and which were flown at the highest altitudes and speeds resulted in levels of deposition which are well below the levels at which harm could be caused to plants.

3.460. Further, the wider scientific evidence as to the toxicity of the spray mixture shows conclusively that, in the quantities in which there would be deposit from drift, the spray mixture is simply incapable of causing the harms to human health and animals alleged by Ecuador and the inhabitants of the border regions.

3.461. The only evidence which Ecuador puts forward to show that the alleged harm has occurred is a collection of statements by residents of the border communities, and supposedly corroborating secondary material, all of which is in fact based on the assertions of individuals that claim to have suffered harm as a result of spraying.

3.462. However, both the witness statements and the secondary material are not worthy of any credibility. As Colombia has explained, there are serious grounds for concern as to the way in which the witness statements placed before the Court in these proceedings were obtained and prepared. Further, the allegations of the witnesses (and individuals whose claims are reported in the secondary material) as to the place and timing of spraying, are conclusively shown to be false by the spray data in a large number of cases. If it is not credible that there was any spraying anywhere near the places, or at the times at which the various individuals allege that they were oversprayed, observed spraying or felt its effects, their other claims as to the damage they allegedly suffered as a result are likewise not deserving of belief.

3.463. As the episode with Mr Mestanza clearly demonstrates, there is a tendency for the alleged witnesses and other individuals to blame the spraying within Colombia for all of their woes. They appear to be prepared to advance that position fraudulently, with a view to personal gain, as seems to be the case with Mr Mestanza.

3.464. Moreover, the scientific evidence shows both that there are a variety of other causes for each and every one of the symptoms allegedly caused by the spraying, and that the spraying itself could not have caused the effects alleged.

3.465. As a consequence, as a whole, Ecuador's case on harm fails.

Chapter 4

LEGAL ISSUES

A. Introduction

4.1. Four of the eight chapters of Ecuador's *Reply* are devoted to the legal allegations made against Colombia, specifically:

- that it failed to conduct an EIA, or otherwise to assess potential harm to Ecuador (ER Chapter 4);
- that it violated Ecuador's territorial sovereignty (ER Chapter 5);
- that it violated international environmental law and is responsible for environmental harm thereby caused (ER Chapter 6), and
- that it violated the human and indigenous rights of Ecuadorians (ER Chapter 7).

These allegations were already comprehensively dealt with in the *Counter-Memorial*, and relatively little needs to be added here. It is proposed to deal with them *seriatim* in Sections B-E of this Chapter, followed by brief conclusions (Section F). The purely hypothetical issue of remedies will be dealt with, again briefly, in Chapter 5.

B. EIA and the Environmental Management Plan

4.2. Contrary to Ecuador's assertions in its *Reply*, this Chapter will show that the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate Herbicide, PECIG, implemented by Colombia for nearly two decades, has at all times been developed in strict compliance with its domestic regulations and with due diligence, including environmental impact assessments and other scientific studies that allowed it to establish that the PECIG did not pose any significant risk for human health and the environment.

4.3. The aerial spraying program began under the purview of Law 30 of 1986 which entrusted the National Narcotics Council with the duty to eradicate illicit crops through the most appropriate means, following the favourable opinions of the agencies responsible for the health of the country's population and the preservation and balance of its ecosystems.

4.4. The Council announced the eradication strategy in 1992, including the spraying of illicit crops, following consultations with environmental, agricultural and health agencies, in full conformity with the legal provisions in force at the time, as explained further in this Chapter.

4.5. When Law 99 of 1993 creating the Ministry for the Environment and the National Environmental System was enacted, the aerial spraying of illicit crops throughout the national territory was already in place. This law was supplemented by Decree 1753 of 1994 that authorized the

continuity of projects or activities initiated in accordance with the regulations in force prior to Law 99 of 1993, and provided for the discretionary power of the environmental authority to request the submission of environmental management plans for such activities.

4.6. Pursuant to that discretionary power, the Ministry for the Environment requested the National Narcotics Directorate ("DNE" for its Spanish acronym), to prepare and submit an EMP, a requirement that was complied with in 1998. At the Ministry's request, the EMP was supplemented and formally adopted by the Ministry through Resolution 1065 of 2001, again in compliance with national law.

4.7. Prior to the implementation of the EMP, environmental studies that included the essential elements characterizing an Environmental Impact Assessment were conducted, both in the area of assessing the PECIG's potential impacts, as well as in matters relating to prevention, correction and compensation. These studies showed, as did all the scientific studies concerning glyphosate and its various commercial formulations, that the spray mixture did not pose a significant risk to human health or the environment.[758]

4.8. Furthermore, within the scope of the exercise of due diligence, even prior to the implementation of the

[758] CCM, Vol. II, Annex 96 and Annex 101; see also: CCM, Vol. III, Annex 124 and Annex 125, and CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogota enclosing answers from EPA and bibliography of studies on glyphosate herbicide, 23 Sep 2011.

Environmental Management Plan, the Program was under continuous monitoring by several government agencies and was subject to external audit, as will be explained.[759]

(1) THE ENVIRONMENTAL MANAGEMENT PLAN FOR PECIG

4.9. Ecuador claims that Colombia failed to conduct an Environmental Impact Assessment (EIA) either before or after the start of the PECIG.[760] But when the aerial spraying program started in the provinces adjacent to the Ecuador border in 2000, studies and monitoring activities had been performed, including environmental impact studies, showing the Program's efficacy in the eradication of illicit crops while ensuring protection of the environment.[761] The process by which this had occurred may be briefly recalled.

4.10. Law 30 of 1986, by which the National Statute on Narcotics was adopted, created the National Narcotics Council

---

[759] CR, Vol. IV, 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 Nov. 2011; Vol. IV, Annex 41: List of External Environmental Audits by the National Narcotics Directorate (DNE); Vol. V, Annex 58: Embassy of the United States of America, List of Aerial Eradication Verification Mission Reports since 1997.

[760] ER, paras. 4.10-4.47

[761] CCM, Vol. II, Annexes 35 and 36; Vol. III, Annex 123; CR, Vol. III, Annex 20: National Narcotics Directorate (DNE), *Environmental Management Plan (EMP) Eradication of Illicit Crops, Chapter VII, Identification and Assessment of Environmental Impact,* 30 Oct. 1998; CR, Vol. III, Annex 21: National Narcotics Directorate (DNE), *Environmental Impact of Illicit Coca Crops and their Eradication by Aerial Spraying with Glyphosate in the Bio-geographical Region of the Amazon and Orinoco Basins, Colombia,* Dec. 1994.

(CNE, for its Spanish acronym) and ascribed to it, among others, the following duties:

> "The National Narcotics Council has the following duties:
>
> Provide for the destruction of coca, marijuana and other crops from which substances causing dependence may be extracted, using the most appropriate means, *following the favourable opinion of the agencies entrusted with protecting the health of the population and the preservation and balance of the country's ecosystem.*"[762]

4.11. In 1992, the CNE announced the Government's strategy for the eradication of illicit crops, which included aerial spraying.[763] The National Institute for Natural Renewable Resources (INDERENA, for its Spanish acronym) and the Health Ministry were involved in this process: the former, by recommending that the Program should be audited; and the latter, by designing an epidemiological surveillance plan.

4.12. As a result of the tests conducted and under constant assessment by the Colombian Agriculture and Livestock Institute (ICA, for its Spanish acronym),[764] on 28 June 1993 the Anti-Narcotics Police requested the CNE to authorize the implementation of aerial eradication in the whole country.

---

[762] CR, Vol. III, Annex 22: Colombian Law 30 of 1986, Article 91 (g). (Emphasis added)

[763] CCM, Vol. II, Annex 31.

[764] ICA was the agency that set the program's technical parameters for operations and verified that no manifest phytotoxical damages were caused to the environment by the sprayings.

4.13. Prior to authorizing the Program's implementation in the whole country,[765] the CNE requested the Health Ministry and INDERENA to render their opinion. Those opinions were duly obtained in 1994, as Ecuador's own expert, Ms Rojas, acknowledges.[766]

4.14. On 22 December 1993, Law 99, the "Law on the Environment" was enacted, whereby the Ministry for the Environment was created, and several aspects relating to the protection of the environment were regulated.

(a) The transitional regime

4.15. As recalled in Colombia's *Counter-Memorial*, the Law on the Environment established two different regimes.[767] One was for the regulation of activities that were underway prior to its entry into force; another for new projects, works or activities to be undertaken after 22 December 1993. Aerial spraying was an activity that was being conducted prior to the enactment of that Law.

4.16. The Law on the Environment set the requirement for an environmental license only for *new* projects, works or activities that "may cause serious deterioration of natural renewable resources or the environment[,] or introduce considerable or

---

765 CCM, Vol. II, Annex 37.

766 C. Rojas, "*The Aerial Spray Program and Violations of Colombia's Domestic Laws Regarding The Environment And The Rights Of Indigenous Peoples (Jan. 2011)*" (hereafter referred to as Rojas Report), ER, Vol. II, Annex 8, para. 69.

767 CCM, paras. 4.10, 4.11.

notorious modifications to the landscape."[768] The aerial spraying of herbicides was not considered to be such an activity.[769] This is not incidental as, before the Law on the Environment (Law 99 of 1993) was enacted, Colombia had already ascertained that the sprayings did not pose significant risks to human and animal health and the environment, as shown in Section B (2) below, setting out Colombia's exercise of due diligence in conducting the Program.

4.17. Moreover, it is the same Law 99 of 1993 that expressly listed in Article 52, the projects, works or activities deemed to "*generate a significant environmental impact"* and that are therefore required to obtain an Environmental License, prior to their start, the granting of which is entrusted to the Ministry for the Environment. The list of such projects, works or activities reads as follows:

> "1. Undertaking of works and activities for exploration, exploitation, transport, and storage of hydrocarbons and the construction of oil refineries.
>
> 2. Undertaking of large-scale mining projects.
>
> 3. Construction of dams or water-collecting areas with a greater capacity then two hundred million cubic metres and the construction of electricity generating plants that exceed 100,000 kW installed capacity, as well as setting the transport cables of the electric interconnection national system, and

---

768 CR, Vol. III, Annex 23: Colombian Law 99 of 1993, Article 49.

769 CR Vol. II, Annex 7: Colombian Expert on Environmental Law, Mr. José Vicente Zapata, *Critique of the Report Prepared by Ms. Claudia Rojas Quiñonez dated January 2011 on 'The Aerial Spray Program and Violations of Colombia's Domestic Laws Regarding The Environment And The Rights Of Indigenous Peoples'*, Nov. 2011. (Hereafter referred to as Zapata Report) For Mr Zapata's credentials see *ibid.*, paras. 10-11.

exploration projects and use of virtually contaminating alternative energy.

4. Construction or expansion of deep-draft sea ports.

5. Construction of international airports.

6. Undertaking of public Works for national road, fluvial or rail networks.

7. Construction of irrigation districts for over 20,000 hectares

8. Production and importation of pesticides, and those substances, materials or products subject to control pursuant to international treaties, agreements, and protocols.

9. Projects that affect the National Natural Parks System.

10. Projects undertaken by the Regional Autonomous Corporations referred to in numeral 19, article 31of this law.

11. Transfusing of one basin into another of water streams that exceed two (2) m/s during low flow seasons.

12. Bringing into the country parent species for reproduction of fauna and wild flora foreign species that may affect the stability of ecosystems or wildlife.

13. Generation of nuclear energy."

4.18. The activity of aerial herbicide spraying of illicit crops is not listed either expressly or implicitly in Article 52, i.e., that activity was not required to have an environmental license either before Law 99 was enacted in 1993, after its issuance, or following subsequent regulations implementing that Law.[770] In fact, as can be seen from the list, with regard to pesticides, the

[770] CR, Vol. II, Annex 7: Zapata Report, paras. 24 and 26-33.

only environmental license that was and to this day is required concerns the production and importation of the products.[771]

4.19. The Law on the Environment also established a transitional regime for those projects or activities that were underway prior to December 1993. In this regard, the Law on the Environment stated that all activities or projects that had been established and were on-going prior to its entry into force could continue without the need to apply for an environmental licence or carry out an Environmental Impact Assessment.[772]

4.20. The Law was supplemented by Decree 1753 of 1994. Pursuant to article 38 of this regulatory decree, the relevant environmental authorities reserved the right to request the submission of environmental management plans for the activities, works or projects falling under the transitional regime.[773]

4.21. Decree 1753 of 1994 did not set a specific timeframe or limit for the establishment of an environmental management plan to the extent that it was discretionary on the part of the environmental authority and not a necessary requirement.

---

[771] CR, Vol. III, Annex 23: Colombian Law 99 of 1993, Article 52; Vol. II, Annex 7: Zapata Report, paras. 27, 59-60. See also: Andean Community, *Andean Regulation for the Registration and Control of Chemical Pesticides for Agricultural Use*, Decision 436 of 1998, Article 16. Available at: http://www.comunidadandina.org/normativa/dec/D436.htm (Last visited 10 Nov. 2011).

[772] CR, Vol. III, Annex 23: Colombian Law 99 of 1993, Article 117; Vol. III, Annex 28: National Narcotics Council, Minutes N° 01 of 8 Mar. 1996, numeral 5.

[773] CCM, Vol. II, Annex 38, Decree 1753 of 1994, Article 38.

4.22. The aerial spraying program had been underway prior to 1993, with the fulfilment of the requirements set out in Law 30 of 1986,[774] that is, it had been approved in conformity with the then existing legislation. Therefore, the PECIG continued under the transitional regime established in conformity with Law 99 of 1993 and Decree 1753 of 1994.[775]

4.23. In a response provided by the then-Minister of the Environment, Mr Juan Mayr Maldonado, to the Secretary General of the Colombian Senate, dated the 10 August 2001, the Ministry confirmed that "the aerial aspersion with glyphosate had the favourable opinion of the environmental authorities of the time and was in accordance with environmental regulations, duly supported in technical studies provided by the DNE and as well as those requested by the INDERENA" (prior environmental authority to the Ministry of the Environment).[776]

4.24. Likewise, in a response provided by Minister Mayr to the Office to the Ombudsman in a public hearing held on 24 August 2001, the Ministry confirmed that:

---

[774] CCM, para 4.9. See also: CCM, Vol. II, Annex 37, Resolution 001 of 1994 : "In compliance with Article 91 (g) of Law 30 of 1986, approving concept was requested and obtained from the Health Ministry and the National Institute for Renewable Natural Resources and the Environment – INDERENA- as stated in the letters dated 11 and 8 October 1993, respectively, signed by the Health Ministry and the General Director of that Institute, the authorities commissioned to safeguard public health and guarantee preservation and stability of the environment."

[775] CCM, Vol. II, Annex 38; CR, Vol. III, Annex 23: Colombian Law 99 of 1993, Article 117.

[776] CR, Vol. III, Annex 24: Note from the Minister for the Environment, Mr. Juan Mayr Maldonado, to the Secretary General of the Colombian Senate, 10 Aug. 2001.

> "Given that the procedure was authorized prior to the creation of the Ministry of the Environment, the environmental measures were covered by the transitional regime established by Article 38 of Decree 1753/1994, which establishes that projects, works or activities which, in accordance with laws in force prior to the issue of this decree, had obtained permits, concessions, licenses or authorizations of an environmental nature, as then required, might continue, but the competent environmental authority might require them, through motivated order, to present environmental management, recovery and restoration plans...".[777]

4.25. As noted in a letter from the Minister for the Environment to the Minister of Justice of 20 December 1994, the aerial spraying program was a matter of public policy and was characterized by continuity:[778] as such, it clearly fell under the transitional regime.

4.26. As Ecuador acknowledges,[779] in 1995, the Colombian Council of State held the same view:

> "Having duly established that the eradication of illicit crops is an activity entrusted to the National Narcotics Council since 1986, which executes it through the Anti-Narcotics Directorate of the National Police, and that it started it prior to the issuance of Law 99 of 1993 and its regulatory

---

[777] CR, Vol. III, Annex 25: Note 0001-1-928 of 17 August 2001 from the Ombudsman requesting a public hearing to the Minister for the Environment on the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate, and the corresponding minutes of the hearing, 24 Aug. 2001, p. 6.

[778] ER, Vol. V, Annex 123, the original Spanish reads*: "la fumigación obedece a una política de control de orden público por lo tanto no tiene solución de continuidad, motivo por el cual la situación de las fumigaciones cabe perfectamente dentro del régimen de transición".*

[779] ER, Vol. II, Annex 8, Rojas Report, para. 71.

> decree, as shown by the opinions of the health and environmental authorities referred-to above, it is concluded that the transitional regime provided for in that same law and developed in its regulatory decree, according to which an environmental license is not required is to be applied to said activity, and that it can continue to be carried out, without prejudice to the fact that the environmental authorities can intervene when they deem necessary to enforce compliance with the laws that regulate the environment in order to maintain it healthy, recover it or restore it as the case may be.
>
> The Minister for the Environment so considered it, in letter of 20 December 1994, addressed to the Minister of Justice and Law, in page 119 of the case file, where she states that: 'It is necessary to point out that the opinion rendered by Inderena maintains its legal validity, since it was the relevant agency for environmental matters prior to the entry into force of Law 99 of 1993 and it applied the provisions in force at that time. It should be added, that the spraying is in pursuance of a policy of control of the public order, therefore, there is no discontinuance, and thus the situation of the sprayings fits perfectly within the transitional regime.'"[780]

The same conclusion is reached in the annexed expert report on Colombian law (the "Zapata Report").[781]

4.27. It is thus clear that the PECIG fell under the transitional regime provided for in the Law on the Environment and regulatory Decree 1753 of 1994, and that it was discretionary on the part of the Environment Ministry to require an EMP.

---

[780] CR, Vol. III, Annex 27: Council of State of Colombia, Chamber of Contentious Administrative Affairs, Order of 15 Aug. 1995, p. 15 (excerpts).

[781] CR, Vol. II, Annex 7: Zapata Report, paras. 30-38.

(b) Development of the Environmental Management Plan

4.28. Decree 1753 of 1994 first defined the Environmental Management Plan by stating that it is that which establishes, in a detailed manner, the actions required to prevent, mitigate, control, compensate, and correct for possible negative environmental effects or impacts caused in the implementation of a project, work or activity. It also includes follow-up, evaluation, monitoring plans and contingency plans.[782] In other words, an Environmental Management Plan comprises the essential elements of an Environmental Impact Assessment and a Contingency Plan. It was neither necessary, nor a legal requirement, for the PECIG to have a separate EIA. Rather, it was deemed to be included in the EMP. The Vice-Minister of the Environment confirmed this during a session of the National Narcotics Council (CNE) on 8 March 1996.[783]

4.29. By Order No. 558 A of 13 August 1996, the Ministry for the Environment required the submission of an Environmental Management Plan in accordance with the terms of reference for the environmental study to be carried out by the National Narcotics Directorate – DNE regarding the Program. This Order triggered a series of administrative and legal actions relating to the contents of the EMP.

---

782 CCM, Vol. II, Annex 38, Decree 1753 of 1994, Article 1.

783 CR, Vol. III, Annex 28: National Narcotics Council, Minutes N° 01 of 8 Mar. 1996, numeral 5. Some excerpts have been redacted in the original annex given the classified nature of the Minutes of the National Narcotics Council (pursuant to article 94 of Law 30 of 1986) and they do not deal with issues concerning the current case.

4.30. The following chronology explains the main administrative exchanges that took place between 1996 and 2003 (which were described in a partial and subjective fashion in Ecuador's *Reply*):

- On 30 July 1998 DNE submitted the EMP to the Ministry for the Environment;[784] this was supplemented on 30 October 1998 by a further Chapter VII entitled "Identification and Assessment of Environmental Impacts".[785] This document was the in-depth environmental impact study required under the transitional regime.

- In particular, section 1.1. of Chapter VII, entitled: "Impact Analysis", states as follows: "[t]he currently existing environmental conditions in the zones representative of the natural regions considered in the study have been taken into account for the assessment of impacts...".[786] The EMP goes on to explain the methodology employed and to rate impacts and the likelihood

[784] CR, Vol. III, Annex 29: Note 11430 from the Ministry of Justice and Law, National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan for the Application of Glyphosate in the Eradication of Illicit Crops, 30 July 1998.

[785] CR, Vol. III, Annex 30: Note 16341 from the Ministry of Justice and Law, National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing Chapter VII of the *Environmental Management Plan for the Application of Glyphosate in the Eradication of Illicit Crops, 30 Oct. 1998*; Vol. III, Annex 20: National Narcotics Directorate (DNE), *Environmental Management Plan (EMP) Eradication of Illicit Crops, Chapter VII, Identification and Assessment of Environmental Impact*, 30 Oct. 1998.

[786] CR, Vol. III, Annex 20, p. 1.

of their occurrence. Soil, water, air, biotic issues, are analysed, as well as the interaction between crop eradication and the environment, taking into account *inter alia* biophysical, biotic and socio-economic components, and activities or actions relating to the crop eradication process itself.[787]

- On 23 December 1999, the Ministry for the Environment issued Order 599 requesting DNE to complete the EMP on the basis of technical opinion No. 419-99 of 21 December 1999. This opinion had concluded that the aerial sprayings did not cause harm to human health and the environment.[788]

- DNE appealed against Order 599 on 1 February 2000.[789] DNE had the right under Colombian administrative law to present its views if it disagreed with the Ministry's Order from a technical or legal point of view.

- After some exchanges, on 13 September 2000,[790] DNE submitted the supplementary information on the EMP requested by the Ministry for the

---

787 CR, Vol. III, Annex 20, pp. 1, 3.

788 ER, Vol. V, Annex 132.

789 CR, Vol. III, Annex 26: Note N° 01888 from the National Narcotics Directorate (DNE), Appeal submitted by DNE, of Order 599 of 1999 from the Ministry for the Environment, 1 Feb. 2000.

790 CR, Vol. III, Annex 31: National Narcotics Directorate (DNE), Environmental Management Plan for the application of glyphosate herbicide in the eradication of illicit crops with Supplementary Information, submitted by the DNE to the Ministry for the Environment, 13 Sep. 2000.

Environment; this was further supplemented on 17 October 2000.

- In May 2001 the Ministry for the Environment requested certain specifications and preventive measures.[791]

- On 8 August 2001 DNE submitted a first advance report in response to the Ministry's request.[792] On 6 November 2001 it submitted the final version of the EMP.[793]

- The EMP was formally adopted by the Ministry for the Environment by Resolution No. 1065 of 26 November 2001[794] following a process which began in 1996 with the issuance of the terms of reference for an environmental study to be conducted by DNE.[795] The EMP was subsequently amended by Resolution No. 1054 of 30 September 2003.[796] The Ministry for the Environment accepted in its entirety the final version of the EMP presented by DNE.

---

791 EM, Vol. II, Annex 14

792 CR, Vol. III, Annex 32: Note N° 24171 from the National Narcotics Directorate (DNE) to the Ministry for the Environment, 8 Aug. 2001.

793 CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001.

794 EM, Vol. II, Annex 15; CCM, Vol. II, Annex 45.

795 For a review of the background of the EMP, see CCM, paras. 4.8-4.14.

796 CCM, Vol. II, Annex 50.

- The 2001 EMP includes a section entitled "Environmental Impact-Risk Assessment", the purpose of which is described as follows:

> "This part of the study is aimed at identifying, predicting and assessing the importance of the program's potential impacts and to select the measures of prevention, correction and compensation that are required in order to make it environmentally viable."[797]

- The Environmental Impact-Risk Assessment of 2001 comprised the following sections:

"4. ENVIRONMENTAL IMPACT-RISK ASSESSMENT

4.1 General aspects

4.1.1 Assessment criteria

4.1.2 Effects of glyphosate

4.2 Impact on physical environment

4.2.1 Impact on soil

4.2.2 Impact on water

4.2.3 Impact on atmospheric resources

4.3 Biotic impact

4.3.1 Impact on vegetation

4.3.2 Impact on fauna and migratory birds

4.4 Socioeconomic impact

4.4.1 Impact on public health

---

[797] CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001, p. 111.

4.4.2 Impact on agricultural production and livestock

4.4.3 Impact on human settlements and migration

4.4.4 Cultural impact

4.4.5 Other impacts

4.5 General summary"[798]

4.31. The EMP is a thorough study, consistent with the structure of both an EIA and an EMP. Under Colombian law – the applicable law – it was equivalent to an EIA, as the following extract shows:

> "This Environmental Management Plan (EMP) has been prepared according to the regulations provided for in Decree 1753, 1994 and the requirements included in Resolution 0341, 2001 issued by the Ministry of the Environment to the National Narcotics Directorate (DNE).
>
> The Plan includes five chapters and an Executive Summary:
>
> - Chapter 1 comprises an introduction to the EMP with a general description of the objectives, sites of the illicit crops, justification for the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate – PECIG –, legal framework, background and institutional structure.
>
> - Chapter 2 includes a description of the Program, its stages of development, the characterization of glyphosate as herbicide, application method, equipment and materials used and the institutional and operational organization to execute same.

[798] CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001, Chapter 4.

- Chapter 3 describes the general baseline of the Program comprised by the general physical, biotic and socioeconomic conditions of the coca and poppy areas and the socioeconomic and environmental impact created by the illicit crops, the stage within which PECIG control activities are performed.

- Chapter 4 includes an assessment of the environmental impacts created by the eradication of illicit crops by aerial spraying with glyphosate, particularly on soil, water, vegetation, fauna, health of the human population exposed to it and agriculture and livestock production.

Finally, as a result of the above, Chapter 5 shows the Environmental Management Plan as such, encompassing a set of preventive, corrective, mitigation and compensation measures of the impacts generated.

According to the regulations in force, although an environmental management plan must be focused on the measures to be applied for the control of impacts of a certain activity or project, *it has been deemed convenient to give this EMP a similar structure as that of a regular Environmental Impact Study, due to the high sensitivity existing around the subject of aerial spraying of the illicit crops with glyphosate*.

It must be observed, however, that this is the framework of an Environmental Management Plan at a national level and coverage, developed to encompass the eradication of illicit crop activities through aerial spraying with glyphosate in all the areas where they are found, now or in the future. Thus, and due to the illicit nature of these crops, the detailed environmental characterization of the areas to be sprayed is considered to be the object of the immediate stage prior to the spraying operation in order to determine, in real time, the environmental

and socioeconomic conditions to be taken into account during the spraying process."[799]

4.32. Thus, as described above, Chapters 3 and 4 of the EMP contain the constituent elements of an EIA and only Chapter 5 constitutes the Environmental Management Plan as such – i.e., a set of preventive, corrective, mitigation and compensation measures of the impacts generated.[800]

4.33. Ecuador interprets the process of implementation of the EMP as evidence of a breach by Colombia of its own laws and regulations,[801] but it is no such thing. That the approval process for the EMP took some years, from 1998 to 2001, is not in any way a breach of Colombian law. On the contrary, these internal exchanges show that there was an effective process of monitoring and review of the Program by the competent agencies of the Colombian Government, a process that brought the EMP up to date with changing environmental regulations, contributed to improve the Program and facilitated its implementation.

4.34. The EMP "is a dynamic instrument which can be adjusted in line with the individual features of the activity and environmental conditions in the area where the project is being

---

[799] CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001, p. 4. (Emphasis added)

[800] *Ibid.*, Chapters 3 to 5.

[801] ER, paras. 4.24-4.35.

executed".[802] Thus, the EMP was adjusted in 2003, streamlining the follow-up records from 13 to 8, and including other agencies entrusted with tasks relating to the implementation of the Program. The Resolution ordering this amendment also confirmed the 100-metre safety strips as set out in Decree 1843 of 1991, in force to date.[803] This amendment was made as a result of the verification activities and follow-up of the Program, within the framework of the quarterly reports provided for in the EMP, which led to the Ministry of the Environment's acceptance of the amendment.[804]

4.35. Moreover, the clear and continued review by the Ministry of the Environment summarized above is indicative of the fact that the Colombian Government was seeking to ensure full knowledge of any impacts and exercising permanent oversight. During the review process, DNE was entitled to exercise its right to dispute aspects it did not agree with: it is disingenuous of Ecuador to interpret this conduct as involving any disregard of the requirements of Colombian law.

4.36. It is important to recall again that in 2004 the highest administrative tribunal of Colombia, the Council of State, dismissed an action brought against the Ministry of the Environment seeking discontinuance of the aerial spraying

802 CCM, Vol. II, Annex 50.

803 CCM, Vol. II, Annex 30, Article 87. Article 87 of Decree 1843 of 1991 is quoted in unnumbered para. 5 (pp. 1-2), of Resolution 1054 of 2003 (the 2003 EMP), at CCM, Vol. II, Annex 50.

804 CR, Annex IV, Vol. 34: Ministry for the Environment of Colombia, Technical Opinion N° 1059, 24 Sep. 2003, p. 4.

program on the basis of an alleged transgression of environmental rights and obligations.

4.37. After a careful review of the documentary evidence, the Council of State concluded that the grounds for the claim were not valid. In its view, there was no need to suspend or halt the aerial sprayings for the following reasons:

> "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. Clearly, the guidelines stated by the environmental authorities should be followed when illicit crops are being sprayed, and not even the slightest deviation from these should be permitted, which means that it is therefore necessary for permanent controls to be undertaken, with continuous evaluations, of any effects which might begin to appear. This nevertheless cannot lead to fumigation activities being suspended, since such a measure could weaken the state and at the same time would reinforce the different groups which finance themselves by illicit drug trafficking, something which without any shadow of doubt is a scourge on Colombian society and on mankind as a whole. The fact is not overlooked – because the evidence clearly demonstrates it – that certain problems and complaints do arise, but these are not as serious as the plaintiff claims, and this means that permanent and strict controls of fumigation activities are required.
>
> It should be stressed that there is no evidence whatsoever on the file to accredit any failure to comply with the measures that were imposed on the National Narcotics Division by the Ministry for the

> Environment in Resolution No. 341 of 2001, whereby decisions were made in connection with the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate, and that there is therefore no reason whatsoever to reproach the Ministry for the Environment for not penalizing the National Narcotics Division for such alleged default.
>
> Finally, it should be said that Article 6 in Law 99 of 1993 cannot be used as legal justification for concluding that the suspension of aerial spraying activities should be decreed, as referred to in the suit, as an effective measure for preventing degradation of the environment, since there is no valid reason under the current circumstances for claiming that the danger exists of serious and irreversible damage, which such an extreme measure would imply. It is nevertheless advisable to order the Ministry for the Environment to continue to comply strictly with the Environmental Management Plan, and furthermore to not stop carrying out studies with a view to obtaining even more details of the effects of the chemical compound that is used in the spraying, with verification by the National Narcotics Division."[805]

4.38. This is dispositive of the lawfulness of the Program under Colombian law. It is so treated in the Zapata Report.[806]

4.39. It should be noted that while the EMP was being completed, all the parameters identified therein were applied in practice. In addition, the regulations in force at the time clearly provided that the process of establishment of the EMP allowed for the DNE to provide additional or complementary information as the process itself evolved. As will be seen, audits,

---

805 CCM, Vol. II, Annex 54.

806 CR, Vol. II, Annex 7: Zapata Report, paras. 56-57.

including studies of soil and water, and impact on human health, as well as verifications of the spraying missions, had been taking place since the 1990s.

4.40. The assessments carried out by Colombia concluded that there was no risk of significant harm from the aerial spraying activities. Independent scientific analyses of the spray mixture used in the program and tests conducted by Ecuador itself on the ground in 2004 also excluded that the aerial sprayings presented significant hazards for human health and the environment. In other words, Colombia did conduct an EIA prior to the start of the spraying operations in the border area with Ecuador, and thereafter it continued to perform all the necessary monitoring activities to ensure compliance with the EMP, built on the basis of the EIA. By doing so, Colombia fully complied with its obligations of due diligence to take all reasonable steps to prevent any possible impact on human health and the environment.

4.41. On the basis of the EMP, the aerial spraying program was subject to a continuous and diligent monitoring under the double scrutiny of the Ministry for the Environment and of an external audit – as will now be seen.

(2) COLOMBIA'S EXERCISE OF DUE DILIGENCE IN CONDUCTING THE PROGRAM

4.42. Colombia has conducted the PECIG with due diligence, having devoted significant resources to reviewing the potential environmental impact of the program and ascertaining whether

it presented any significant risks to human and animal health and the environment. In this context, there have been studies on the PECIG prior to and following the year 2000, and the Program has continued to be subjected to continuous and rigorous monitoring.[807]

(a) Studies prior to 2000, with continuity in subsequent years

4.43. Colombia's exercise of due diligence is evidenced by the very selection of the herbicide to be used in the PECIG. Colombia chose for its aerial spraying program the leading herbicide used worldwide in agriculture. Its most common use is the control and eradication of weeds in agricultural settings such as orchards, field borders and pastures. Glyphosate and glyphosate formulations are also employed outside of the agricultural setting for the management of invasive plant species that threaten sensitive environments and endangered species, since it has no negative effects on these ecosystems.

---

[807] CCM, Vol. III, Annexes 116 and 131; CR, Vol. III, Annex 20: National Narcotics Directorate (DNE), *Environmental Management Plan (EMP) Eradication of Illicit Crops, Chapter VII, Identification and Assessment of Environmental Impact*, 30 Oct. 1998; CR, Vol. III, Annex 21: National Narcotics Directorate (DNE), *Environmental Impact of Illicit Coca Crops and their Eradication by Aerial Spraying with Glyphosate in the Bio-geographical Region of the Colombian Amazon and Orinoco Basins*, Dec.1994. See also: CR, Vol. III, Annex 31: National Narcotics Directorate (DNE), *Environmental Management Plan for the application of glyphosate herbicide in the eradication of illicit crops with Supplementary Information, submitted by the DNE to the Ministry for the Environment*, 13 Sep. 2000; CR, Vol. III, Annex 33: Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001.

4.44. In order to arrive at its decision, Colombia resorted to comparative studies between different herbicides, which indicated glyphosate in terms of its non-effect on human health and the environment.[808] Moreover, glyphosate formulations duly registered with the EPA and backed by rigorous scientific studies were selected.[809]

4.45. Given its wide-spread use, glyphosate has been widely studied and its properties are well known. Numerous international studies were taken into account when glyphosate was selected as the active ingredient.[810]

4.46. The Colombian Ministry of Health issued toxicological opinions on several glyphosate-formulated products, in 1992, 1993, 1994, 1999, 2000, 2001, 2002, 2003, 2006 and 2008.[811] All the opinions that refer to glyphosate state it to be toxicity category IV (slightly toxic).

---

[808] CR, Vol. V, Annex 59: U.S. Department of State, Bureau for International Narcotics Matters, Herbicide Selection for Coca Eradication, May 1984.

[809] See above, paras. 2.34-2.38. CR, Vol. IV, Annex 55: Note from the Environmental Protection Agency (EPA) to the United States Embassy in Bogotá, enclosing answers and bibliography of studies on glyphosate herbicide, 23 Sep. 2011, attached bibliography.

[810] CR, Vol. III, Annex 31, Sections 7.1 and 7.2, pp. 127-131. For instance, Section 7.1 of the 2000 document, entitled: "Herbicides displacement in soils", refers to the following studies: Letey and Farmer (1994), Stikler, Knake and Hinestry (1969), Weed and Weber (1994), Riley and Eagle (1994). Section 7.2 refers to reports on research on the effects of glyphosate herbicide on tropical soils, and discusses the following studies: Willis (1994), C.S. Helling (1997), Claes (1998), Mendoza et al. (1998).

[811] CR, Vol. IV, Annex 35: Ministry of Health, Toxicological Opinion N° LP – 0173 – 93, 2 Apr. 1993; Toxicological Opinion N° MP – 12118 – 2001, 5 Nov. 2001; Toxicological Opinion N° LP – 12499 – 2002, 29 Apr. 2002.

4.47. In 1994 a study on the Environmental Impact of Illicit Coca Crops and their Eradication by Aerial Spraying with Glyphosate in the Bio-geographical Region of the Amazon and Orinoco Basins, Colombia, was conducted.[812] The study contains an ecological characterization of the illicit coca crops, an assessment of the environmental impact of coca crops on the Orinoco and the Amazon Basin, and an environmental impact assessment of eradication by aerial spraying with glyphosate. The latter includes tables and figures relating to: Identification of Environmental Impact caused by Illicit Coca Crops by Aerial Spraying with Glyphosate, Characterization of Environmental Effects, Audit Process, Theoretical/Practical Context of Environmental Audit, Actions and Recommendations - Audit Observations.

4.48. In addition to this, within the framework of the environmental characterization which, according to the Ministry for the Environment's technical opinion No. 419-99 of 21 December 1999, consisted of "the physical-biotic, geologic and geomorphologic components, soil and uses of soil, hydrology, vegetation, fauna, hydro biological resources",[813] Colombia ascertained that the spray mixture used in the Program did not affect water sources and soils, based on existing studies and by directly conducting relevant analyses.

---

812 CR, Vol. III, Annex 21: National Narcotics Directorate (DNE), *Environmental Impact of Illicit Coca Crops and their Eradication by Aerial Spraying with Glyphosate in the Bio-geographical Region of the Colombian Amazon and Orinoco Basins*, Dec. 1994.

813 ER, Vol. V, Annex 132 , p. 5.

4.49. This Technical Opinion shows that the Ministry carried out tests of water in areas that had been directly sprayed and found only "traces of Glyphosate that did not exceed 6 ppm, [parts per million] which is a low concentration that initially dilutes and subsequently deteriorates as a result of microbial action."[814]

4.50. In relation to soils, the Technical Opinion stated that:

> "C.S. Helling (1997) worked on the environmental dissipation, Panama and Peru regions with high doses, no residues were found of parent material or its principal metabolite, amino acid aminomethylphosphonic (AMPA), in samples of soils taken after 1.5 to 3 months from the application.
>
> The mobility in the soil was reduced when it coincided with a high pH and the presence of large quantities of inorganic phosphates. It is rapidly absorbed and rapidly affixes on the soil, related to the quantity of sites that link with available phosphates.
>
> Microbial degradation processes in different strains of degradation with first-order linear kinetics. AMPA metabolite is more persistent. The glyphosate has an average life of 47 days and all the crops can be planted or transplanted immediately after its application.
>
> No significant changes in the populations of bacteria and fungi are reported in the soil, especially in nitrifiers.
>
> …In a field experiment for forest ecosystems, the glyphosate rapidly dissipated in a small stream of very slow flow, in an 8-hectare area aerially sprayed with Roundup.

---

814 ER, Vol. V, Annex 132, p. 8.

> The metabolic degradation in plants and animals is minimal or almost nonexistent..."[815]

4.51. These water and soil analyses continued to be conducted throughout the course of the Program. As reported by the ICA to the Ministry for the Environment in July 2002, the results from four water samples taken from the Catatumbo Region (in north-eastern Colombia) showed no traces of glyphosate.[816] Likewise, analyses of water samples collected in Caquetá (south-eastern Colombia) in December 2002, showed the same negative results, as reported by ICA to DNE.[817] Records for water samples analysis from 2005 to 2007, collected in different regions in the framework of the PECIG, also show negative results for traces of glyphosate or AMPA.[818]

4.52. Corroborating the studies according to which glyphosate is swiftly degraded in soils without causing adverse effects on its microorganisms, soil sample analyses between 2005 and 2008,[819] including those conducted in Nariño and Putumayo by

---

[815] ER, Vol. V, Annex 132, pp. 5-6.

[816] CR, Vol. IV, Annex 36: Note N° 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.

[817] CR, Vol. IV, 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 Jan. 2003.

[818] CR, Vol. IV, Annex 38: Records of Water Samples Analysis Results 2005-2007 in the framework of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG). See also: CCM, Vol. II, Annex 70, Appendices 4-5.

[819] CR, Vol. IV, Annex 39: Records of Soil Samples Analysis Results 2005-2008 in the framework of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG). See also: CCM, Vol. II, Annex 70, Appendices 2-3.

Colombian authorities, found no traces of glyphosate or AMPA residues.

4.53. The EMP submitted to the Environment Ministry in 2001 is particularly telling with regard to the attention that characterised the entire process of the Program's implementation prior to 2000:

> "1.3 BACKGROUND
>
> (…) The Program for the Eradication of Illicit Crops has developed the processes detailed below to determine the use of Glyphosate during the aerial spraying of illicit crops.
>
> The Colombian Government has been using the aerial spraying method as a highly efficient and effective mechanism for the elimination of illicit crops since 1984, without prejudice to the ongoing plans, social agreements for voluntary eradication with the participation of local communities. Thus, from 1988, the ruling Government considered convenient to involve the environmental variable in the application of the mentioned method, by petition of the INDERENA (National Institute for Natural Renewable Resources and the Environment). Based on this decision, several studies were carried out tending to environmentally characterize the illicit crop areas and to establish environmental administration methods.
>
> It is clear from past studies that the decision to recommend Glyphosate was due to a systematic and scientific procedure which considered the most advisable environmental and toxicological risk variables, as elements guiding the criteria for its selection, to date.
>
> In the beginning of 1994 a Scientific and Technical Agreement between the National Narcotics Directorate (DNE), the United States Department of Agriculture (USDA-ARS) and the Programming

> Office of the Narcotics Affairs Section (NAS) of the Embassy of the United States in Colombia was entered into with the purpose of carrying out tests for "Control, Estimate and Environmental Impact of Illicit Coca Crops"; those tests were performed in San Jose del Guaviare.
>
> In December 1996, the final considerations of the report on the Legal and Technical Aspects for Eradication of Illicit Crops were presented to the National Narcotics Council, by which it is established that according to health and ecological studies, aerial spraying with Glyphosate carried out subject to technical parameters was not harmful either to human health nor to the environment.
>
> Moreover, actions towards developing environmental measures have been taken, among which the following could be mentioned: the incorporation of environmental prevention programs and campaigns, seminars which have been held with different regional entities on the effects of the Eradication Program, the setting up of protocols and operational procedures allowing for prevention and minimizing possible impacts on areas which are not the objective of the Program, the determination and geographical references of those sites where the Program is not in operation such as: National Parks, Alternative Development Projects, Eradication Agreements, etc. as well as permanent surveillance on the sprayed areas."[820]

4.54. As to the justification of the Program, the "location and approaches" section of the 2001 EMP, contains data on the area planted with illicit coca crops in the Colombian provinces, where the dramatic situation of Putumayo at the time is made apparent, since it was the province that was most affected by the

[820] CR, Vol. III Annex 33, p. 11.

presence of illicit crops, with 66,022 hectares of coca crops, equal to 40% of the nation's total.[821]

4.55. The PECIG has been carefully studied and implemented. In addition to the aforementioned analyses, numerous independent scientific analyses of the mixture were conducted during the life of the program, including the independent CICAD I and CICAD II studies, within the framework of the Organization of American States (OAS), and the toxicity studies conducted by a US laboratory contracted by the State Department in 2003 and reviewed by the EPA.[822] Those various studies attest to the fact that the mixture used in Colombia's aerial spraying program has no significant impact on human health and the environment.

(b) Environmental Impact Assessment within the framework of the EMP

4.56. As explained above, upon the entry into force of Law 99 of 1993, the PECIG came within the purview of the transitional regime,[823] as corroborated at the time by the Ministry for the Environment on several occasions.[824] Therefore, pursuant to that Law and the transitional regime regulated by Article 38 of Decree 1753 of 1994, the PECIG was not required to obtain an environmental license or conduct an EIA, due to the fact that it

821 CR, Vol. III, Annex 33, pp. 15 -17.

822 See above para. 2.55. CR, Vol. V, Annex 56: United States Environmental Protection Agency (EPA), Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia.

823 CCM, paras. 4.10-4.11; CR, Vol. II, Annex 7, Zapata Report, para. 30.

824 See above, para. 4.24.

had been implemented prior to 1993 and it had not been included within the activities listed as requiring an environmental license and an EIA, as expressly set out in Article 52 of Law 99 of 1993.[825]

4.57. In accordance with the transitional regime, the Program could continue and the environmental authority had the discretionary power, not a duty, to request an EMP for activities under the transitional regime. Therefore, as the Minister of Environment explained in 2001, requesting an EMP did not entail suspending the Program's activities until it was implemented,[826] since the PECIG already had the environmental and health authorisations required by Law 30 of 1986. This was consistent with the decision of the Colombian Council of State delivered in 1995.[827]

4.58. In addition to the EIA contained in Chapter VII of the 1998 EMP, Chapter V of the document entitled "Supplementary Information to the Environmental Management Plan for the Application of the Herbicide Glyphosate in the Eradication of Illicit Crops, Bogota, September 2000", contained an

---

825 See above, Section B (1) (a) *The transitional regime*. CR, Vol. II, Annex 7: Zapata Report, paras. 24, 28, 30 and 60.3.

826 CR, Vol. III, Annex 24: Note from the Minister for Environment, Mr. Juan Mayr Maldonado, to the Secretary General of the Colombian Senate, 10 Aug. 2001.

827 CR, Vol. III, Annex 27: Council of State of Colombia, Chamber of Contentious Administrative Affairs, Order of 15 August 1995, p. 17 (excerpts).

"Assessment of Environmental Impacts of Eradication with Glyphosate in the Short, Mid, and Long Term".[828]

4.59. The 2000 Supplementary Information to the EMP also includes the following EIA elements: Chapter II, relating to the "Determination of Aspects and Criteria (environmental, socio-economic, and operational) considered in the Selection of Reference Areas", and Chapter III, entitled "Designing the Specific Measures foreseen in the Plan for Environmental Prevention, Correction, Mitigation, and Compensation for the Effects that may result from the Application of Glyphosate for the Eradication of Illicit Crops in Areas Neighboring the National Natural Parks System (Amendment of numeral 2 of article 1 of Order 599 of December 1999 by Order No. 143 of March 2000)".[829]

4.60. Furthermore, in the final version of the EMP which was adopted in 2001, it is clearly set out that the EMP has been structured as an EIA:

> "According to the regulations in force, although an environmental management plan must be focused on the measures to be applied for the control of impacts of a certain activity or project, it has been deemed convenient to give this EMP a similar structure as that of a regular Environmental Impact Study, due to the high sensitivity existing around the subject of aerial spraying of the illicit crops with glyphosate."[830]

---

828 CR, Vol. III, Annex 31, Table of contents, Chapter V.

829 CR, Vol. III, Annex 31, Table of contents, Chapters II and III.

830 CR, Vol. III, Annex 33, Introduction, p. 4.

4.61. Chapter 4 of the 2001 EMP includes an assessment of the environmental impacts generated by the eradication of illicit crops by aerial spraying with glyphosate, particularly on soil, water, vegetation, fauna, health of the human population exposed to it, and agriculture and livestock production. Nearly fifty pages are devoted to this section entitled "Environmental Impact-Risk Assessment". Its purpose is stated as "aimed at identifying, predicting and assessing the importance of the program's potential impacts and to select the measures of prevention, correction and compensation that are required in order to make it environmentally viable."[831]

4.62. The content of Chapter 4 of the 2001 EMP shows how it is fully consistent with the essential elements of an EIA:

> "4. ENVIRONMENTAL IMPACT-RISK ASSESSMENT
>
> 4.1 General aspects
>
> 4.1.1 Assessment criteria
>
> 4.1.2 Effects of glyphosate
>
> 4.2 Impact on physical environment
>
> 4.2.1 Impact on soil
>
> 4.2.2 Impact on water
>
> 4.2.3 Impact on atmospheric resources
>
> 4.3 Biotic impact
>
> 4.3.1 Impact on vegetation
>
> 4.3.2 Impact on fauna and migratory birds
>
> 4.4 Socioeconomic impact
>
> 4.4.1 Impact on public health

831 CR, Vol. III, Annex 33, p. 111

4.4.2 Impact on agricultural production and livestock

4.4.3 Impact on human settlements and migration

4.4.4 Cultural impact

4.4.5 Other impacts

4.5 General summary"[832]

4.63. Chapter 3 of the 2001 EMP also supplements certain elements of the EIA, as it "describes the general baseline of the Program comprised by the general physical, biotic and socioeconomic conditions of the coca and poppy areas and the socioeconomic and environmental impact created by the illicit crops, the stage within which PECIG control activities are performed".[833] Its table of contents reads as follows:

"3. ENVIRONMENTAL BASELINE

3.1. Identification of the area of influence

3.1.1 Criteria for the selection of the areas for aerial spraying

3.1.2 Areas of influence for PECIG

3.2 General conditions of the illicit crop areas in Colombia

3.2.1 Physical components

3.2.2 Biotic conditions

3.2.3 Social, economic and cultural components

3.2.4 Social deterioration induced by illicit crops: social frame of PECIG

3.2.5 Environmental deterioration due to illicit crops: environmental framework of PECIG

832 CR, Vol. III, Annex 33, Table of contents, Chapter 4.

833 *Ibid.,* p. 4.

3.3 Environmental zoning

3.3.1 General conclusion

3.3.2 Criteria of environmental zoning for spraying

3.3.3 General zoning"[834]

4.64. To summarize, the PECIG has been conducted with due diligence and, in accordance with the relevant provisions of Colombian law, the necessary environmental impact assessments have been conducted in order to ascertain that the Program did not cause adverse effects on human health, the environment, flora and fauna.[835]

4.65. It is precisely the due diligence with which Colombia has implemented the Program that has allowed it to show, in Chapters 2 and 3 above, that the damages alleged by Ecuador have not occurred.

(c) Monitoring and Audit

4.66. Three types of supervision have been enforced on the program to ensure its adequate implementation. First, the Ministry for the Environment's oversight of the activities with regard to environmental monitoring foreseen in Record 5 of the Program's EMP;[836] second, the monthly external audit reports

---

834 CR, Vol. III, Annex 33, Table of contents, Chapter 3.

835 CR, Vol. II, Annex 7, Zapata Report, paras. 14, 26-38, 59-61.

836 CR, Vol. IV, 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 Nov. 2011; Vol. IV, Annex 40-A: Ministry for the Environment, Order No. 2282 whereby a monitoring of

contracted by DNE, in compliance with the EMP, since the 1990s;[837] and third, the verification missions by the Embassy of the United States, which, since 1997, have been carried out jointly with Colombian officials (Anti-Narcotics Police, Ministry for Environment, ICA, DNE, IGAC).[838]

4.67. An example of the strict oversight of the aerial sprayings program by the Ministry for the Environment, is Order No. 2282 of 21 December 2005, in which the results of a technical visit to the sites affected by sprayings in the provinces of Putumayo and Caquetá are described. In addition to the Ministry for the Environment, officials from the National Geographic Institute,

---

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 Dec. 2005.; Vol. IV, 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 Dec. 2005.

837 CCM, paras. 4.28-4.29. CCM, Vol. II, Annexes 37, 41, 49; CR, Vol. IV, Annex 41: List of External Environmental Audits by the National Narcotics Directorate (DNE); 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 Mar. 1997; 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 Sep. 2000, 18 Oct. 2000; 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 Nov. to 9 Dec. 2003. 18 Dec. 2003; 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. Nov. to 4 Dec.2004, 7 Dec. 2004; 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 Dec. 2006 to 18 Jan. 2007. Jan. 2007.

838 CCM, Vol. II, Annex 70, Appendix 1; CR, Vol. V, Annex 58: Embassy of the United States of America, List of Aerial Eradication Verification Mission since 1997; Appendix: Implementation of the verification protocol January – July 1998, carried out October 18-23, 1998.

National Narcotics Directorate, Colombian Institute of Agriculture and Livestock (ICA), and the Narcotics Affairs Section of the Embassy of the United States in Bogotá also participated in the visit. Water, soil and vegetation samples were collected in accordance with ICA protocols.[839] Among the conclusions reached as a result of the site visit, are the following:

> "(…) loss of foliage in arboreal and bush species was not evidenced, in areas adjacent to sprayed plots. No adverse effect to lawful economic [crop activities] was observed, other than that which was inside the coca plots (…)"[840]
>
> "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 (…)"[841]

4.68. Moreover, the documents recording the review performed by the Ministry for the Environment show that the program's operations respected the presence of indigenous reserves, even when illicit coca crops were detected.[842]

---

839 CR, Vol. IV, 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 Dec. 2005, p. 4.

840 *Ibid.,* p. 5.

841 *Ibid.*, p. 12

842 CR, Vol. IV, 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 Dec. 2005, p. 2.

4.69. The monthly external audit contracted by DNE since the 1990s, has assessed the Program's environmental impacts and made recommendations that are followed as evidenced in subsequent audit reports. The audit reports also describe the activities carried out during the relevant periods, including inter-agency meetings, aerial reconnaissance and verifications, spraying operations, and management indicators. Relevant examples of these external audits for 1997, 2000, 2003 and 2007 can be found at Annex41 (A-E) of the present Rejoinder.[843]

4.70. For instance, the supplementary information submitted with the EMP in 2000 contains a description of the detailed verifications that had been carried out between 1995 and 1997, in order to gauge natural regeneration processes and ensure that natural vegetation surrounding illicit crops subject to eradication remained unaffected. The relevant information included a series of photographs from plots sprayed in different regions and

[843] CR, Vol. IV, Annex 41: List of External Environmental Audits by the National Narcotics Directorate (DNE); 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 Mar. 1997; 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 Sep. 2000, 18 Oct. 2000; 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 Nov. to 9 Dec. 2003. 18 Dec. 2003; 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. Nov. to 4 Dec.2004, 7 Dec. 2004; 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 Dec. 2006 to 18 Jan. 2007. Jan. 2007.

ecosystems in the country, taken at different intervals up to 12 months following the spraying:

> "5.1. Analysis of the verification images of the eradication of illicit crops.
>
> Images of fumigated illicit crops were taken at various times since 1995, with different lapses of time in days after spraying and in different crops (coca-leaf and opium-poppy).
>
> It should be appreciated that the range of information that can be extracted from these image and the figures of the Environmental Audit is very wide. The following can be observed from these images:
>
> That, given the size of the plots chosen for eradication, it is unlikely that nearby vegetation would be affected due to the effects of drift.
>
> The processes of natural regeneration are rapid, indicating that persistence in the soil is moderate because the high density of the illicit crop prevents any significant quantity from reaching it, and the biomass is deposited in the illicit crop. These considerations are the result of observations made by the eradication verification commission, formed by the environmental audit, NAS officers from the US Embassy and active members of DIRAN". [844]

4.71. Similar findings were made by the external audit report following the work of an inter-agency commission convened to verify illicit crops in 1997:

> "The invasion of natural vegetation (grasses and herbaceous), of the destroyed forests [due to coca cultivation] is abundant and aggressive, particularly in those plots that had not been subjected to indiscriminate and uncontrolled use of

[844] CR, Vol. III, Annex 31, Section 5.1., pp. 53 – 83.

> agrochemicals during their growing 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)."[845]

4.72. The continuous care and control exercised over the Program is evidenced by the verification mission reports from the United States' Embassy in Bogota, that include information on the members of the evaluation commission, evaluation parameters, selection of plots, work schedule, logistics and reporting, environment and other aspects, recommendations, etc.[846] Thus, for instance, in a Verification Mission conducted in 1998, the following findings were reported:

> "In all lots verified from the air or on the ground, an aggressive natural regeneration process can be observed, with a large number of species. (See photograph VC 16-RVC 03/98). In general, it has been more than 180 days since these lots were sprayed. The excellent biological activity in the soils, both micro-fauna and arthropods, is also worth noting. This means that a good number of insects can be found mainly representatives of the annelids, termites, ants and spiders.
>
> The main species in natural regeneration present in the vegetable succession that are abundant and frequent in the Orinoco biome after spraying are listed below. Structurally, this succession is dominated by a thick herbaceous cover in grasses of

---

845 CR Vol. IV, Annex 41-A, p. 7.

846 CCM, Vol. II, Annex 70, Appendix 1; CR, Vol. V, Annex 58: Embassy of the United States of America, List of Aerial Eradication Verification Mission since 1997.

> the *Panicum sp.* and *Paspallum sp.*, among others."[847]

4.73. In conclusion, with regard to the environmental assessment, the report states:

> "Lastly, there were very few agricultural crops next or close to the illegal coca plantations. Some corn, plantain and yucca could be seen in small lots can be seen [sic], sometimes interspersed with coca lots. However, the cultivation patter[n] is characterized by large patches surrounding primary forest, illegal plantations in different sizes in the middle of the jungle, medium and small illegal coca plantations in marginal areas, either rural or with consolidated settlements, and natural pastures or natural successions with extensive cattle raising. Non[e] of the lots verified showed any damage from Glyphosate."[848]

4.74. The thorough attention to the Program's operation does not end there. The US Department of State, through the Office of Aviation, part of the International Narcotics and Law Enforcement Bureau ("INL"), performs a permanent supervision of the work carried out by the contractor, the US company Dyncorp, in Colombia.

4.75. INL's Office of Aviation regularly reviews Dyncorp's reports, including the monthly management reports, which in turn include daily and weekly reports from each Forward Operating Location "FOL" (Colombia is not the only country

---

[847] CR, Vol. V, Annex 58-Appendix: Implementation of the verification protocol January – July 1998, carried out October 18-23, 1998. Section 6: *Qualitative environmental evaluation of spraying and illegal crops*, Section 6.2.: *Environmental Impact of Illegal Crops*.

[848] *Ibid.*

where this collaboration has been implemented: Peru, Bolivia and Guatemala have received similar training and programmes). INL has assigned officials to Colombia and other specialist officials routinely visit the country, allowing for direct and permanent supervision. The country manager sends a monthly report which is then consolidated with the other country reports by the Deputy Director of the Office of Aviation, in order to produce the contractor's monthly evaluation.[849]

4.76. All of the above goes to demonstrate the extent to which Colombia applied care and due diligence to the conduct of the aerial sprayings program throughout its duration, and that all the necessary controls and measures have been adopted in order to ensure that that is the case.

4.77. Thus, in the light of the independent scientific evidence and the studies and audits carried out within Colombia there was no reason to believe that the spraying activities would have adverse trans-boundary environmental impacts, even in the remote event that drift were to occur.

(d) Contacts with the Government of Ecuador

4.78. The Colombian Government has held constant meetings and exchanges with the Ecuadorian Government with regard to the PECIG's development.[850]

---

[849] See above, Chapter 2, Section C (2) *(e) Pilots training and performance.*

[850] CCM, paras. 5.10-5.44

4.79. In 2001, Colombia took the initiative of holding a workshop to inform Ecuador of the technical aspects of the Program.[851] Following this Colombian initiative, the two countries set up Scientific and Technical Commissions, which met on four occasions between October 2003 and August 2004. Throughout this period, Colombia submitted four detailed reports on the aerial spraying program to Ecuador and maintained an open and cooperative attitude. To the extent that national security considerations permitted, Colombia shared with Ecuador information and technical data regarding the Program.[852]

4.80. As discussed in Chapter 2 above, in the framework of the activities of these Ecuadorian and Colombian Commissions water samples were taken from the rivers of the Sucumbíos and Esmeraldas provinces by scientists of the Ecuadorian Commission on Atomic Energy (which was part of the Ecuadorian team) on three occasions, in April, May and July 2004. The analyses of the water samples revealed no traces of glyphosate.[853]

(3) EIA REQUIREMENTS IN INTERNATIONAL LAW AND THEIR APPLICATION

4.81. In its *Reply*, Ecuador argues that – irrespective of whether the PECIG has caused any actual harm to Ecuador or its citizens – Colombia is in breach of international law in

---

851 CCM, para. 5.11.
852 CCM, paras. 5.19-5.44.
853 See above, paras. 2.30-2.31. See also, CCM, paras. 5.30-5.32, 5.37.

commencing the Program without an adequate EIA, and further, that it is also in breach for continuing the program without continuing and adequate monitoring assessment.[854] It has been shown in the preceding section that this claim fails as a matter of fact and of Colombian law. It equally fails as a matter of international law. This is not surprising since (a) international law was not more stringent at relevant times than national legal systems such as that of Colombia; (b) this Court has specifically stated that the content and modalities of EIA are a matter for the relevant national law; (c) the relevant national law was authoritatively determined by the Council of State in 1995.

4.82. Ecuador now relies primarily not on such extra-regional standards as those of the Espoo Convention (which featured strongly in its *Memorial*[855]) but on this Court's decision of 2010 in *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*. This requires further analysis.

4.83. In its Judgment on the merits in *Pulp Mills*,[856] the Court had to deal with Argentina's argument that Uruguay failed to carry out an appropriate EIA prior to authorizing the construction of the pulp mills. The Court held that customary international law does not specify the scope and content of an environmental impact assessment, but rather these are to be found in the domestic legislation of each State:

---

854 ER, Chapter 4, Sections I, II; Chap. 6, Sections III, A-C.

855 EM, paras. 8,25 fn. 644, 8.38, 8.44, 8.47 fn. 692, 8.49, 8.50, 8.56 fn. 709, 8.68.

856 *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010.*

> "[I]t is the view of the Court that it is for each State to determine in its domestic legislation or in the authorization process for the project, the specific content of the environmental impact assessment required in each case, having regard to the nature and magnitude of the proposed development and its likely adverse impact on the environment as well as to the need to exercise due diligence in conducting such an assessment. The Court also considers that an environmental impact assessment must be conducted prior to the implementation of a project. Moreover, once operations have started and, where necessary, throughout the life of the project, continuous monitoring of its effects on the environment shall be undertaken."[857]

4.84. In the context of discussing the scope of the obligations arising under Article 41 of the 1975 Statute, the Court affirmed the customary law character of the requirement to carry out an EIA, where the planned activity is liable to cause harm to a shared resource or significant transboundary harm.

4.85. It is important not to lose sight of the fact that the Court based its analysis in that case on the obligations and rights of the parties under a bilateral treaty, which is not the case with Colombia and Ecuador, and that the essential premise was that the "activity may have a *significant adverse impact in a transboundary context*, in particular, on a shared resource",[858] which is also not the case here: as Colombia has shown in Chapters 2 and 3 above, the spraying in its territory has not in

---

[857] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 205.

[858] *Ibid.,* para. 204 (emphasis added).

fact caused, and was not liable to cause, significant adverse impacts in a transboundary context or on any shared resource.

4.86. Further, in *Pulp Mills* there was no dispute between the parties that a full EIA was necessary; as the Court recorded:

> "The Parties agree on the need for a full environmental impact assessment in order to assess any significant damage which might be caused by a plan."[859]

Rather, the dispute between the parties on this point concerned whether the scope and conduct of the EIA which had in fact been conducted by Uruguay had been sufficient.

4.87. Argentina argued that the EIA conducted by Uruguay had been incomplete, in particular insofar as it made "no provision for alternative sites for the mills and failed to include any consultation of the affected populations",[860] and further argued that the EIA had been deficient on the basis, *inter alia*, that it had "failed to take account of all potential impacts from the mill, even though international law and practice require it".[861] In support of that position, it relied on both the Espoo Convention and the UNEP 1987 Goals and Principles.[862]

4.88. The Court affirmed that, under the 1975 Statute, the parties were required "for the purposes of protecting and preserving the aquatic environment with respect to activities

---

[859] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 116; see also para. 203.
[860] *Ibid*., para. 118.
[861] *Ibid*., para. 203.
[862] *Ibid*.

which may be liable to cause transboundary harm, to carry out an environmental impact assessment."[863] That interpretation was based on an evolutive interpretation of Article 41 of the 1975 Statute, in light of the …

> "practice, which in recent years has gained so much acceptance among States that it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource."[864]

4.89. As noted above, in *Pulp Mills*, Argentina had argued that the EIA which had been carried out by Uruguay had been insufficient because it had not sufficiently consulted local populations in Argentina who might be affected by its operations. In this regard, Argentina invoked, *inter alia*, the Espoo Convention, Article 13 of the 2001 International Law Commission draft Articles on Prevention of Transboundary Harm from Hazardous Activities, and Principles 7 and 8 of the UNEP Goals and Principles.[865]

4.90. The Court disposed of that argument bluntly, simply stating that "no legal obligation to consult the affected populations arises for the Parties from the instruments invoked

---

[863] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 204.
[864] *Ibid*.
[865] *Ibid.*, para. 215.

by Argentina",[866] before going on to find that, as a matter of fact, consultation had actually taken place.[867]

4.91. It seems that the Court's ruling on the point is that there was no customary law obligation to consult the potentially affected population in Argentina, even in relation to a shared resource. This is necessarily so given the fact that neither Argentina nor Uruguay was party to the Espoo Convention, the Court's ruling the UNEP Goals and Principles were not binding, and the fact that the ILC's Draft Articles on Prevention could only have been invoked on the basis that they represented customary international law, which has not been established.

4.92. No doubt as a consequence of the Court's decision, Ecuador has, albeit *sub silentio*, dropped the argument previously made in the *Memorial*[868] to the effect that there is an obligation as a matter of customary international environmental law to carry out consultation with affected populations, although it has reserved the right to argue that such a right exists as a matter of human rights law, and in particular under ILO Convention 169.[869]

4.93. In light of the judgment of the Court, the matters previously in dispute have to a certain extent been narrowed. On the one hand, although Ecuador claimed in its *Reply* that Colombia had not conducted an EIA, Colombia has shown that

---

866 *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 216.
867 *Ibid*., para. 152.
868 EM, paras. 8.55-8.62.
869 ER, para. 6.67 and fn. 1178.

it did in fact do so, and that it has undertaken constant monitoring of the situation (see Chapters 2 & 3). On the other hand, Ecuador's arguments as to the existence of any required content of an EIA as a matter of international law has to a large extent fallen away. In particular its argument that consultation with potentially affected populations in Ecuador was required is no longer tenable as a matter of international environmental law.

(a) Transitional issues

4.94. Before turning to the application of the EIA standard articulated in *Pulp Mills*, three preliminary points should be made.

4.95. First, there is a serious question as to the date at which the obligation to carry out an EIA became an obligation under customary international law, as a "practice, which in recent years has gained so much acceptance among States"[870] and accordingly, whether Colombia was under any such obligation as at the outset of the Program. The Court has made clear in *Pulp Mills* that such an obligation exists, but, given the acceptance of the parties to that case that an EIA was required in 2002/2003, at the time of the initial stages of authorisation of the pulp mills, the Court did not have to express a view as to precisely when that obligation crystallized.

4.96. It should be stressed that relevant legal instruments are not applicable to Colombia, since it is not a party to them, some

[870] ER, para. 6.29.

of them have not entered into force, and others are applicable only to European states. For example:

- UNCLOS, Article 206 (in force 16 November 1994); Colombia has not ratified this Convention and, in any event, this article is irrelevant, since it relates to the marine environment.
- 1997 Watercourses Convention, Article 12 (not yet in force).
- Not even the Espoo Convention would have applied. That Convention only came into force in the European region on 10 September 1997. Its application is circumscribed to Europe. Even after the Espoo Convention entered into force, the process of the adoption of the treaty was such that binding bilateral relationships between co-riparian states emerged only gradually. For example, within the Danube River basin, several co-riparians only ratified the agreement in the late 1990s and early 2000s, e.g., the Czech Republic (2001), Germany (2002), Romania (2001), Slovakia (1999), Slovenia (1998) and Ukraine (1999). The only non-European state that signed the Convention – but did not ratify it – was the United States.

4.97. In this regard it is useful to recall the Court's warning against laying down the law *sub specie legis ferendae* before the legislator has laid it down.[871]

4.98. In the present case, as already demonstrated, the national aerial spraying program had already been approved by 1993, and benefited from the transitional regime established by the 1993 Law and 1994 Decree.[872] The Council of State (Supreme Administrative Court) so held in 1995.[873] There is no reason, and no basis, for this Court to take another view on a matter expressly referred to national law.

4.99. Nonetheless, for the sake of argument, this section of the *Rejoinder* will proceed on the assumption that the international law on EIA has not materially changed since the early 1990s, and was at all relevant times as the Court declared it to be in 2010.

4.100. This leads to a second preliminary point. On the assumption made (*arguendo*) in the preceding paragraph, there can be no objection that the EIA was carried out voluntarily and not as a matter of legal requirement, provided it was in substance carried out, as here. The *Pulp Mills* decision itself recognizes an obligation of assessment as part of due diligence, although the content of the assessment process is to be defined by reference to national law. Provided the national authorities

---

[871] *Fisheries Jurisdiction (United Kingdom v Iceland)*, *ICJ Reports 1974*, p. 175, para. 53.

[872] See above, paras. 4.5, 4.15-4.27.

[873] See above, para. 4.26.

acted reasonably in the circumstances, account being taken of the requirements of national law at the time, an international court should second guess their decision only on the basis of very clear evidence to the contrary. The only question is whether in fact an assessment was carried out, involving due diligence.

4.101. The third preliminary point is one of nomenclature. It does not matter whether or not the process is called an EIA provided that it fulfils the purpose the Court had in mind in *Pulp Mills*. In that regard, it must be the case that national law can adopt reasonable transitional provisions for work already in progress, and that an international court or tribunal will defer to these.

(b) The content of the obligation of assessment

4.102. In its judgment in *Pulp Mills* the Court makes it clear that the touchstone for the content of an EIA is the requirements of national law, subject to the proviso that national law adequately implements the obligation of due diligence which characterises the obligation of prevention.[874]

4.103. An initial point to be made – and a vital one – is that there is no convincing evidence, let alone any proof, that the spraying has *caused* the harms alleged by Ecuador, or indeed any harm whatever: see Chapters 2-3 above. It will no doubt be said that this is irrelevant because what is at stake is an

[874] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 205.

obligation of assessment, and that the eventual outcome of the assessment cannot without circularity be read back into the assessment obligation itself. But this is completely to overlook the fact that assessments *were* carried out, and continued, and that the results of these assessments have been vindicated in the event. It is not suggested that a national authority can justify a total absence of assessment by reference to the fact that no harm is caused. But that is not this case. Rather assessments were carried out, compliant with national law, which considered the risks and concluded they were acceptable, even *de minimis*. The body of scientific expertise, and the scientific data, annexed to this *Rejoinder* demonstrates that that assessment was essentially correct. It would be an arid and unrealistic finding for the Court to hold nonetheless that more should have been done when the only result would have been the confirmation of the assessments actually carried out – and fully vindicated by later inquiry.

(c) Colombia complied with its assessment obligations

4.104. For the reasons already given and amply demonstrated above, Colombia complied fully with its assessment obligations:

(a) An adequate assessment of the risks of the spraying program, in accordance with the relevant requirements of Colombian law as it stood at the relevant time, was in fact undertaken in advance of the inception of the spraying program.

(b) Although the studies were not formally denominated an EIA, they were thorough,

systematic and (in the result) correct. In the circumstances the assessment was equivalent to what would have been required by a formal EIA, and it was consistent with Colombian law at the time.

(c) That assessment reasonably concluded that there was in fact no risk of harm from the spray program, whether within Colombia or (*a fortiori*) within Ecuador.

(d) There was no scientific uncertainty in relation to the properties and potential effects of the ingredients of the spray mixture, such as would justify a precautionary approach. In any event, as attested by the attached scientific reports, Colombia's approach was precautionary.

(e) There was thereafter adequate monitoring of the situation after the inception of the Program.

For these reasons, Colombia has fully complied with its obligation of due diligence in terms both of initial and subsequent assessment.

(4) CONCLUSIONS

4.105. Glyphosate is the most widely used commercial herbicide in the world. Furthermore, the glyphosate formula used for the aerial sprayings of illegal coca crops underwent the entire toxicological assessment process required for its authorization for agricultural use. While the formulation was

scientifically designed to cause a known, predictable effect on plant metabolism, it was determined to be (and is in fact) safe for humans and animals. Moreover, even though the formula did not present risks of significant harm to humans, animals and the environment, Colombia consistently acted with due diligence in the conduct of the Program.

4.106. The PECIG has always had an environmental management element that establishes, in a detailed manner, the actions required to prevent, mitigate, control, compensate, and correct the possible negative environmental effects or impacts caused in the implementation of a project, work or activity. It also included follow-up, evaluation, and monitoring plans and contingency plans. In other words, the Environmental Management Plan necessarily comprised the essential elements of an Environmental Impact Assessment and a Contingency Plan.

4.107. The PECIG was introduced and implemented in various regions of Colombia without any significant impact for human health or the environment.

4.108. Colombia undertook appropriate studies as part of an Environmental Management Plan (EMP) for the PECIG prior to the beginning of the spraying operations in 2000 in the area bordering Ecuador, with the purpose of determining eventual impacts on human health and the environment. The EMP was the result of a dynamic process in which the Colombian agencies involved in the PECIG took part, in order to

progressively improve it, all in accordance with Colombia's legislation. The cumulative effect of the EMP and related work was at least equivalent to an EIA, and such equivalence is the most that general international law can require in the absence of an express treaty stipulation (which does not exist in the present case).

4.109. The spraying operations were conducted with due diligence and under strict supervision. The operations were subjected to regular audits and monitoring by the Ministry for the Environment, by external auditors contracted by the DNE and through verification missions arranged by the Government of the United States.

4.110. Under these circumstances Ecuador's claim of breach of the obligation of due diligence based on failure of assessment, fails.

C. Ecuador's Claims based on Violation of Territorial Sovereignty

(1) ECUADOR'S RELIANCE ON A PANOPLY OF IRRELEVANT RULES

4.111. In Chapter 5 of its *Reply*, Ecuador alleges that Colombia has "violated the duty to respect Ecuador's sovereignty." To a large extent it does so simply by recycling claims it makes in other chapters: for example, it claims as a violation of sovereignty and territorial integrity Colombia's alleged failure to conduct an EIA and to exercise due diligence in authorizing the

spraying activities.[875] Thus arguments which – as shown again in this *Rejoinder* – fail on their merits are called back to the stage dressed in the garb of sovereignty, in the hope of a better reception. The exercise is without point or significance: the rules (whatever they were at the relevant time) about assessment of risk or due diligence in conducting activities which may have a transboundary effect were, and are, *already* rules about the coexistence of sovereigns. The rules gain nothing in force or effect by one of the two sovereigns repeating the word "sovereignty" after its actual case has failed for want of proof.

4.112. The relatively brief chapter – a striking example of fact-free pleading – goes on to make the following points:

- The spray program is said to have caused major harm in Colombia.[876] Besides the fact that this is not true, it would be completely irrelevant to allegations of harm from spray drift in Ecuador, still less to questions of territorial sovereignty.
- Citing the *Corfu Channel* case, amid other authorities, Ecuador relies on the obligation not to intervene in the internal or external affairs of other States.[877] The reasoning is incomprehensible: by carrying out lawful anti-drug activities in its own territory Colombia in no way intervenes in Ecuadorian affairs, and that

875 ER, para 5.1.
876 ER, paras. 5.3-5.5.
877 ER, para. 5.8.

remains true even if minute amounts of spray mixture drift across the border. Elsewhere, it may be noted, Ecuador disclaims the "hermetic" theory of absolute sovereignty which its earlier pleadings had implied.[878]

- Ecuador seeks to convert Article 2 of the 1988 Narcotics Convention – an endorsement of effective anti-drugs campaigns such as PECIG – into a guarantee against aerial spraying.[879] This perverse interpretation is discussed briefly below.

- Ecuador goes on to rely on a panoply of irrelevant rules, displaying a tendency to throw a textbook at the spraying program rather than engaging in the actual arguments. Rules relied on include:

  - "the exclusive right to display the activities of a State", relying on that well-known authority on transboundary harm, the *Island of Palmas* case; [880]

  - "the right to exercise permanent sovereignty over the natural resources .... within its

[878] ER, paras. 5.2, 5.14. Ecuador accuses Colombia of fabricating the hermetic thesis without citation, but the passsage cited by Colombia (EM, para 7.2, cited CCM, para 8.34) does carry that implication. It is good that it has been withdrawn, but its withdrawal leaves Ecuador's territorial sovereignty claim legless, without visible means of support.

[879] ER, para. 5.9.

[880] ER, para. 5.10, citing (1928) 2 UNRIAA 839.

territory"[881] (but without identifying the natural resources over which Ecuador has lost its sovereignty);

- "the sovereign right to exploit their own resources"[882] (but without identifying the resources which Ecuador has lost the right to exploit);

- "the sovereign right to close its ports or its airspace if it so wishes"[883] (but the case has nothing to do with closure of ports and airspace).

- It is said that Colombia has "manifestly failed to provide an accurate and complete account of its acts" and has thus "disabled itself from claiming that its actions have respected Ecuador's sovereignty."[884] It ill lies in the mouth of a Claimant which in its *Memorial* had put to the forefront the Mestanza claim to talk about an "accurate and complete" account of anything. That claim is, as has been shown,[885] straightforwardly false and contrived, as Ecuador would have discovered had it shown half the due diligence in investigating its own case that it now seeks from Colombia. In any event, Colombia

881 ER, para. 5.11.
882 ER, para. 5.12.
883 ER, para. 5.13.
884 ER, para. 5.14.
885 See above, Chapter 3, Section E (3), on Puerto Mestanza.

> has, in its *Counter-Memorial* and in this *Rejoinder*, provided a substantial and substantiated account of the PECIG, supported by significant scientific expertise. It is of course for the Court to appraise this body of evidence, but in doing so it will not be aided by rhetorical claims about "disablement".

4.113. As was argued in the *Counter-Memorial*, a case concerned with alleged harm caused by spray drift is not to be resolved by general deductions from sovereignty or territorial integrity.[886] That core point is never satisfactorily addressed by Ecuador in its *Reply* and barely needs repeating. If no significant or material damage is done to a state, its territory or its people by incidental drift of a lawful substance, the case is not affected or strengthened by repeating the allegation in terms of a failure to respect territorial sovereignty or any other of the panoply of rules which Ecuador invokes. The essential dispute between the parties concerns questions of fact, and related questions of causation. There is, correspondingly, little to be said about the law.

(2) THE SOURCE OF OBLIGATION

4.114. Colombia has already set out in the *Counter-Memorial* its arguments as to why Article 2(2) of the 1988 Narcotics Convention does not make respect of the principles of sovereign equality and territorial equality obligations which must be

[886] CCM, paras. 8.32-8.40.

respected under the 1988 Convention.[887] Similarly Article 14(2) should not be interpreted as importing the corpus of international human rights law and environmental law into the Convention.

4.115. Similarly Ecuador's case in relation to Article 14(2) now principally focuses on the extent to which it counteracts the effects of Articles 24 and 25 as *lex specialis*. It accepts that Article 14(2)

> "does not set out special rules on human rights or environmental protection. Rather, it makes only a general reference to the existing law on those subjects, and thus serves to place an explicit limit on the application of the 1988 Narcotics Convention."[888]

Nevertheless Ecuador later argues that, where transboundary harm occurs or is at risk of occurring, its legality...

> "must then be judged in accordance with the applicable rules of general international law on the environment and human rights, as explicitly envisaged by Article 14(2) of the 1988 Narcotics Convention",[889]

and, more clearly, that

> "a State that does *not* exercise due diligence in accordance with the international law standard will thereby fail to 'respect the protection of the environment' and thus be in breach of Article 14(2) of the 1988 Narcotics Convention". [890]

---

887 CCM, paras. 1.12; 8.11-8.18.
888 ER, para. 6.12.
889 ER, para. 6.14.
890 ER, para. 6.15.

4.116. In the event, the Court's reasoning in *Pulp Mills* as to both Articles 1 and 14 provides support for Colombia's arguments as to non-incorporation of obligations under Article 2 (2) and Article 14(2) of the 1988 Narcotics Convention.[891] The Court expressly rejected equivalent Argentine arguments that Article 1 or 41 of the 1975 Statute "incorporated" other environmental treaty obligations. As regards Article 41, it said:

> "However, Article 41 does not incorporate international agreements as such into the 1975 Statute but rather sets obligations for the parties to exercise their regulatory powers, in conformity with applicable international agreements, for the protection and preservation of the aquatic environment of the River Uruguay. Under Article 41 (b) the existing requirements for preventing water pollution and the severity of the penalties are not to be reduced. Finally, paragraph (c) of Article 41 concerns the obligation to inform the other party of plans to prescribe rules on water pollution.
>
> The Court concludes that there is no basis in the text of Article 41 of the 1975 Statute for the contention that it constitutes a 'referral clause'. Consequently, the various multilateral conventions relied on by Argentina are not, as such, incorporated in the 1975 Statute. For that reason, they do not fall within the scope of the compromissory clause and therefore the Court has no jurisdiction to rule whether Uruguay has complied with its obligations thereunder."[892]

The incorporation argument in *Pulp Mills* would have failed on the merits if it had not failed on jurisdiction, and for the same

---

891 ER, para. 6.14.

892 *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, *ICJ Reports 2010,* paras. 62-3.

reasons. For similar reasons the incorporation argument based on Article 14(2) of the 1988 Narcotics Convention – to the extent it is still relied on – must likewise fail.

4.117. In conclusion, Colombia did not breach its obligation to respect Ecuador's sovereignty and territorial integrity. The Judgment in the Pulp Mills case provides no basis for such an allegation on Ecuador's part. Moreover, in that case, Argentina did not even consider invoking a breach of its sovereignty and territorial integrity by Uruguay.

(3) THE AERIAL SPRAYING PROGRAM IN NO WAY AFFECTS ECUADOR'S TERRITORIAL SOVEREIGNTY OR INTEGRITY

4.118. For these reasons, the aerial spraying program in no way impinges upon Ecuador's territorial sovereignty or territorial integrity. On the contrary, permanently to prohibit Colombia from engaging in the program on its own territory, as Ecuador seeks to do, would seriously impinge on Colombia's sovereignty and would affect its capacity to comply with its international obligations in relation to the fight against drug trafficking. These norms support Colombia's continuing right to continue the struggle against illicit and harmful drug trafficking on its own territory. Colombia will return to this point in its concluding Chapter 5.

D. Ecuador's Claims based on Breach of International Environmental Law

4.119. A further basis of complaint on the part of Ecuador is that Colombia has breached its obligations of due diligence to

prevent transboundary environmental harm to Ecuador. In particular in Chapter 6 of its *Reply*,[893] Ecuador complains successively that:

- Colombia did not carry out a transboundary EIA,[894] and failed to comply even with its own EMP;[895]
- Colombia failed to prevent significant harm to the population of Ecuador by "deposition of toxic herbicides over Ecuadorian territory";[896]
- Colombia failed to apply the precautionary principle;[897]
- Colombia failed to give prior notification of "spraying operations likely to affect Ecuador";[898]
- Colombia failed to cooperate with Ecuador and failed to monitor the impact of its spray program on Ecuador.[899]

4.120. The first of these complaints has already been dealt with. Colombia did assess the impact of its proposed program, to the extent required by its own law – the standard laid down by this

---

893 ER, paras. 6.72-6.74 is an interpolated section dealing with buffer zones. It is responded to briefly in Chapter 5 below.
894 ER, paras. 6.29-6.51.
895 ER, paras. 6.68-6.71.
896 ER, paras. 6.52-6.60.
897 ER, paras. 6.51-6.65.
898 ER, paras. 6.66-6.67.
899 ER, paras. 6.66-6.67.

Court in *Pulp Mills*.[900] As to non-compliance with its own EMP;[901] this is (a) untrue (as demonstrated at length in Chapter 2 above) and (b) irrelevant, since there is no separate basis of claim in international law that a State has (hypothetically) failed to comply with its own internal law or procedures.

4.121. As to the remainder of these claims the necessary assumption underlying them is, again, that significant transboundary harm, above the relevant threshold, was caused by spraying activities in Colombia, *viz.*, by incidental drift of spray residues into Ecuador. But as Colombia has shown, there is no credible or reliable evidence of this. In the absence of such evidence, differences between the parties as to the status or content of particular norms do not arise for decision. But the following brief remarks are called for.

4.122. As to the "deposition of toxic herbicides over Ecuadorian territory",[902] Colombia dealt with the applicable law in Chapter 8 of its *Counter-Memorial*. In its *Reply* Ecuador makes little or no attempt to respond, arguing instead that spraying in "inhabited border areas" is "inherently hazardous" and (as to Ecuador) without any "countervailing public benefit".[903] The former claim – notably as concerns the impact of spray drift in canopied areas at distances of several hundred

---

900 *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, *ICJ Reports 2010*, para. 205.
901 ER, paras. 6.68-6.71.
902 ER, paras. 6.52-6.60.
903 ER, paras. 6.52-6.60.

metres or more – is straightforwardly false, as shown in Chapter 2. As to the latter claim, the lack of "countervailing public benefit", Ecuador has accepted through the 1988 Convention the principle of collective interest and collective support in the fight against drug trafficking, including through the use of aerial spraying.[904] It is not open to it now to deny the principles underpinning the Convention on a "not in my backyard" basis, and this would be true even if the impacts in Ecuador's backyard were more significant than has been shown to be the case.

4.123. Ecuador argues that Colombia failed to apply the precautionary principle.[905] It fails signally to comprehend the point made in the *Counter-Memorial*, which was that the precautionary principle or approach is not a free-standing autonomous obligation but a directive or guideline as to the manner in which existing substantive obligations should be applied.[906] Indeed, how *can* something still widely described as an "approach" be anything else: an approach is an approach *to* something else, and is necessarily relative. But again the point does not arise: Ecuador is reduced to the absurd assertion that "there can be no doubt that the kind of transboundary harm suffered by Ecuador amounts to an interference with or denial or the right to sustainable development".[907] In fact there is no evidence at all that the spray program has had the slightest impact on the sustainable development of the relevant

---

904 CCM, paras. 3.40-3.64.
905 ER, paras. 6.52-6.65.
906 CCM, para. 8.57.
907 ER, para. 6.63.

Ecuadorian regions – though there is much else standing in the way of their development, as has been seen.[908]

4.124. The allegation that Colombia failed to give prior notification of "spraying operations likely to affect Ecuador"[909] was dealt with in the *Counter-Memorial*.[910] They key distinction drawn there is that between consultation with Ecuador on the program as a whole – which consultation has certainly occurred[911] – and notification of individual spray missions. The latter are obviously excluded on security grounds, yet the relevant paragraphs of the *Reply* do not even mention that crucial operational consideration.

4.125. Finally, Ecuador continues to assert that Colombia failed to cooperate with Ecuador and in particular that it failed to monitor the impact of its spray program on Ecuador.[912] These allegations have already been shown not to be true; it remains only to observe that if Ecuador had monitored its own territory with greater care, it would not now be making half-baked (more accurately, unbaked) claims. Such monitoring as Ecuador did do supports Colombia's case.[913]

4.126. In a significant passage Ecuador acknowledges Colombia's argument that the obligation of prevention does not entail "the elimination of all risk whatever". It comments that

---

908 CCM, paras. 2.15-2.35. Ecuador's *Reply* does not seek to deny the general picture painted here.
909 ER, paras. 6.66-6.67.
910 CCM, paras. 6.31-6.34.
911 *Ibid.*
912 ER, paras. 6.75-6.84.
913 CCM, paras. 5.45-5.63.

this "might be true if the potential harm were not as significant as it is in this case, or if it did not reach a level that mounted to a threat to human health and livelihood".[914] But in the very same paragraph it contradicts itself, seeking a response from Colombia (on its own territory) that would "*eliminate* the risk of transboundary harm to Ecuador".[915] In fact however, such calculations do not arise: the aerial spraying program is conducted with all care in Colombian territory, and the incidental, occasional and limited amounts of spray drift in no way affects Ecuadorian populations or the environment (see Chapters 2 and 3). There is thus no foothold for Ecuador's argument of breach of norms of international environmental law.

E. Ecuador's Claims based on Human Rights and the Rights of Indigenous Peoples

(1) INTRODUCTION

4.127. In Chapter 7 of the *Reply*, Ecuador attempts to rework its earlier allegations of violation by Colombia of the human rights of individuals and the rights of indigenous peoples within Ecuador as a result of the aerial spraying program, but its essential premise remains: the violations of human and indigenous rights are the consequence of the alleged damages caused by the spraying.

4.128. It is striking that, in the *Reply*, Ecuador no longer alleges that the aerial spraying program has resulted in violations of the

---

914 ER, paras. 6.59, citing CCM, paras 8.555-8.56.

915 ER, paras. 6.59 (emphasis added).

right to life. This is despite the fact that the evidence relied upon by it, including in particular the evidence of its witnesses, contains a number of allegations that deaths were caused as a direct result of the spraying. These allegations have not been formally withdrawn, but the lack of confidence Ecuador displays in the evidence of its own witnesses is telling, particularly given the emphasis it places on other portions of their testimony. Faced with conclusive scientific evidence that the spray mixture simply could not have caused deaths in the manner alleged, Ecuador has preferred to quietly drop any allegation of violation of the right to life, and instead has sought to focus its argument as claims of violation of the right to a decent existence, which is alleged to be linked to the right to health, to food, and access to clean water.[916] In addition, Ecuador argues briefly and subsidiarily that there have been violations of the right to a healthy environment and the right to private life.[917]

4.129. The linchpin of those allegations is of course the evidence of the witnesses put forward with the *Memorial*. Ecuador effectively recycles certain portions of that testimony in Chapter 7 of the *Reply*, in order to support its allegations that the spray drift has resulted in violation of human rights of individuals within Ecuador.[918]

4.130. Colombia has already shown why the evidence of those witnesses is not deserving of credibility: see Chapter 3 above.

---

916 ER, para. 7.20
917 ER, paras. 7.21-7-22.
918 ER, paras. 7.9-7.13.

For the same reasons, the striking concordance of the witnesses as to the supposed effects of the spraying on their health and on plants, which Ecuador relies upon as proving their allegations, should be treated with suspicion. In short, insofar as it alleges serious harm done by the spraying program, their evidence should not be accepted. As set out in Chapter 3, the allegations of the witnesses as to the alleged effect of the spraying on their crops, animals and health are simply inconsistent with the scientific data as to the effects of the components of the spray mixture. Even if the witnesses had been directly oversprayed (which, as the spray flight data conclusively shows, was not the case), the spray mixture could not have caused the effects alleged. *A fortiori*, given Ecuador's case that the effects allegedly experienced resulted from the effects of drift at places located, in the case of some of the witnesses, at considerable distances from the actual spraying events, the various allegations of the witnesses in this regard simply cannot be true.

4.131. On the basis of the evidence, it is clear that the effects alleged by the witnesses could not have occurred, and their evidence should not be believed. In this Chapter, Colombia deals with the legal arguments put forward by Ecuador in response to Colombia's position in the *Counter-Memorial*. But – it can hardly be said too often – this is an abstract exercise. State responsibility in the circumstances of the present case depends on proof of present harm. That proof failing, so do Ecuador's claims of breach of rights.

4.132. In particular, this Section will discuss the following legal issues in contention between the Parties, and which would be in dispute if the facts were not so overwhelmingly in favour of Colombia:

(a) The relevance of human rights arguments in a situation where there is no actual or demonstrable effect on human health, whatever "panic" might be asserted;

(b) The territoriality of human rights obligations and their incidence in this case;

(c) Ecuador's arguments concerning the obligation "to respect and ensure respect for" human rights.

(2) "TARGETING": ECUADOR'S INCOMPREHENSION OF COLOMBIA'S CASE

4.133. The *Reply* asserts that Colombia has argued that, in order for any human rights obligations to be breached, it would have been necessary for Colombia's aerial spraying to have deliberately "targeted" individuals in Ecuador. In this regard, it makes reference to paragraphs 9.13 and 9.14 of Colombia's *Counter-Memorial*.

4.134. This is not at all what Colombia argued: the point made by Colombia was a very different one. Ecuador has in effect taken one word out of context in order to set up a straw man which it can easily knock down. What Colombia said in the relevant passage in the *Counter-Memorial* did not relate to any requirement that individuals should be targeted in order for it to

be possible that their human rights be violated. Rather, it related to the extent to which human rights obligations are to be permitted effectively to be determinative of the content of obligations in other areas of international law which are, in principle, separate and autonomous. More specifically, Colombia's argument concerns the extent to which actions which are otherwise lawful under both international law and Colombian law should nevertheless be considered unlawful because of their alleged incidental impact on the human rights of individuals within Ecuador.

4.135. The point is simple and can be briefly made. Human rights obligations, although a fundamental part of international law, cannot and should not be interpreted in such an expansive fashion as effectively to occupy the entire field and distort the content of other obligations, carefully worked out and carefully balanced. That Ecuador should so obviously misrepresent what Colombia wrote shows its desperation in the face of the facts.

(3) THE TERRITORIALITY OF HUMAN RIGHTS OBLIGATIONS

4.136. Section III of Chapter 7 of Ecuador's *Reply* is devoted to the so-called "territoriality" of human rights obligations. In this regard, Ecuador appears to take a one-size fits all view to the applicability and scope of human rights obligations, rather than paying attention to the specific language of the treaties which it alleges are applicable. In this regard, it places considerable reliance on the notion of a "common legal space" and an "international public order of human rights at the regional

level", as if these were substitutes for analysis of what the relevant treaties in terms provide and the scope of the obligations they impose.

4.137. The fundamental point is that a number of the relevant treaties relied upon by Ecuador (including in particular the ICCPR and the American Convention) contain express limitations on their scope of application, stating that they apply to individuals within their "jurisdiction".

4.138. In its *Counter-Memorial*, Colombia relied on the Advisory Opinion of the Court in *The Wall* as regards the scope of application of the ICCPR, in particular insofar as it confirmed that the scope of the ICCPR was conditioned on the exercise of jurisdiction by a State. Ecuador, in its *Reply*, although noting in passing Colombia's reliance on the Advisory Opinion in *The Wall*,[919] does not thereafter return to it, and prefers not to engage with what the Court actually said. Rather, its tactic is to focus on the supposed notion of an "*espace juridique commun*" under the American Convention, a notion which it appears ultimately to derive from the decision of the European Court in *Banković*.

4.139. The notion of "*espace juridique*" has since been definitively rejected by the European Court as irrelevant to the question of the extra-territorial applicability of obligations under the European Convention. The jurisprudence of the European Court of Human Rights in interpreting the notion of "jurisdiction" under Article 1 of the European Convention

[919] ER, para. 7.29.

confirms that the notion of jurisdiction has to be given meaning and that jurisdiction is essentially territorial; it is only exceptionally and in circumscribed circumstances that the obligations of States parties will be held to apply extraterritorially, and this irrespective of whether the location in which they are acting is inside or outside the so-called *espace juridique* of the European Convention.

4.140. In particular, Ecuador appears to infer an argument *a contrario* from the decision of the European Court in *Banković v. Belgium and others*. It maintains that the principal reason why the Court denied that the respondent States had jurisdiction in relation to the bombing of the Serbian Radio-Television headquarters in Belgrade was that Yugoslavia did not belong to the Convention's "*espace juridique*"[920] and not, as explained by Colombia in its *Counter-Memorial*, that none of the exceptional circumstances for the existence of extraterritorial jurisdiction existed in that particular case.

4.141. By contrast, Ecuador argues that, since Ecuador and Colombia both belong to the American Convention's "common legal space", the criteria set out by the European Court in *Banković* for the determination of whether a State exercises "jurisdiction" do not apply. This reasoning is based on a misunderstanding of the case-law of the European Court of Human Rights, which illustrates clearly that (1) the fact that conduct allegedly in breach of the Convention has taken place outside the "legal space" of the Convention is not determinative

[920] ER, para. 7.30.

of the question whether a Contracting State has exercised "jurisdiction" for the purposes of Article 1 of the European Convention, such that the substantive rights are applicable, and (2) the mere fact that extraterritorial conduct takes place within the territory of another Contracting State (i.e. within the "legal space" of the Convention) is likewise not a determinative factor in assessing whether jurisdiction has been exercised.

4.142. The fact that the European Court in its decision in *Banković* never intended to modify the requirements for the establishment of Article 1 jurisdiction based on whether the applicant was within the European "espace juridique" has now been put beyond doubt by the Grand Chamber's judgment in *Al-Skeini v. United Kingdom*.[921]

4.143. The *Al-Skeini* judgment, which is now the leading judgment on the issue, confirms the principle that extraterritorial jurisdiction under the European Convention is exceptional. In order for a state to be responsible under the Convention for alleged violations of Convention rights which took place in the territory of another State, those acts have to have taken place under its "jurisdiction" with the meaning of Article 1 of the European Convention. The Court, in reconsidering its previous relevant case-law in this regard made clear that such exceptional circumstances will in general arise only where there is an exercise of personal control or authority over an individual, or

[921] *Al-Skeini and Others v. The United Kingdom* [GC] (App. no. 55721/07), Judgement of 7 July 2011, paras. 141-142.

where the State in fact has effective control over a defined area outside its own territory.[922]

4.144. Accordingly, the consistent case-law of the European Court demonstrates that, contrary to Ecuador's argument, the desirability of avoiding "vacuums" in the European system of human rights protection has not been enough for the European Court to bypass the requirement in Article 1 of the European Convention that a State must exercise "jurisdiction" for its responsibility under the Convention to be engaged.

4.145. Ecuador argues that the existence of a common legal space requires by implication that all States are under an obligation to ensure respect for human rights throughout the region, even in respect of individuals who are not under their jurisdiction. That argument is completely unsupported by authority, and were it to be adopted would subvert the law of territory, jurisdiction and responsibility of the states on which the Convention system depends.

4.146. The extracts from the jurisprudence of the Inter-American Commission and Inter-American Court relied upon by Ecuador[923] do not establish its thesis that the existence of a common legal space in any way displaces the applicability of the primarily territorial interpretation of the notion of jurisdiction. In particular, each of the passages from the Preamble of the American Convention cited at para. 7.32 of the

---

[922] *Al-Skeini and Others v. The United Kingdom* [GC] (App. no. 55721/07), Judgement of 7 July 2011, paras. 133-140.

[923] ER, paras. 7.37-7.45.

Reply, the passage from the decision of the Inter-American Commission in *Alejandre v. Cuba* italicized in para. 7.37, the provisions of the American Declaration (wrongly referred to as the "Inter-American Declaration") cited at paras. 7.32 and 7.42 and the passage taken from the Advisory Opinion of the Inter-American Court of Human Rights on *The Effect of Reservations on the Entry into Force of the American Convention on Human Rights* excerpted at para 7.44, do nothing more than reaffirm the undisputed principle of the irrelevance of an individual's nationality for their entitlement to human rights protection under international law.

4.147. What Colombia stresses is not the requirement for any link of nationality but rather the very different requirement of a jurisdictional link between the State's acts and the individuals allegedly affected. In other words, in line with the quotation from the Inter-American Court's Advisory Opinion on *Effect of Reservations*, Colombia, as with the other Contracting Parties, has submitted to a legal order within which the Contracting Parties, "for the common good, assume various obligations, not in relation to other States, but towards all individuals *within their jurisdiction*".[924]

4.148. Quite apart from its reliance on the now-discredited notion of "espace juridique" as a criterion of application, Ecuador maintains that Colombia's actions nevertheless give

[924] *Effect of Reservations on the Entry into Force of the American Convention on Rights (Arts. 74 and 75)*(*Advisory Opinion OC-2/82), I/ACtHR, Series A, No. 2*, para. 29, at *Reply*, para. 7.44. (Emphasis added)

rise to an exercise of extra-territorial jurisdiction. The essential basis of that assertion would appear to be a notion of "cause and effect"; in other words, the very fact that Colombia has allegedly infringed certain human rights of individuals in Ecuadorian territory means that it has exercised jurisdiction over those individuals for the purpose of application of the human rights treaties to which it is a Party.

4.149. As noted in the *Counter-Memorial*, within the European system, such a "cause and effect" notion of jurisdiction was explicitly rejected by the European Court in *Banković*, the European Court noting that

> "the applicants' notion of jurisdiction equates the determination of whether an individual falls within the jurisdiction of a Contracting State with the question of whether that person can be considered to be a victim of a violation of rights guaranteed by the Convention. These are separate and distinct admissibility conditions, each of which has to be satisfied in the afore-mentioned order, before an individual can invoke the Convention provisions against a Contracting State." [925]

That such jurisdictional reasoning is impermissible has now been confirmed by the Grand Chamber of the European Court in *Al-Skeini*: there is a *prior* requirement of either personal control over individuals, or effective control over an area of territory in

[925] *Banković*, para.75; Cf. CCM, para. 9.31.

order for there to be an exercise of extraterritorial jurisdiction triggering Convention standards.[926]

4.150. Ecuador fails to cite any practice or jurisprudence from within the Inter-American system which supports its understanding of the notion of jurisdiction under the American Convention. The closest it comes is the observation of the Inter-American Commission in *Saldaño v. Argentina*, where it concluded that a State Party to the American Convention may be responsible under certain circumstances for the acts and omissions of its agents that produce effects outside that State's own territory.[927] That dictum however does not establish that whenever there is an asserted impact the Convention is engaged, but nothing less than that can avail Ecuador in the present case.

4.151. By analogy, Colombia cannot be considered on any basis to have exercised "jurisdiction" for the purpose of Article 1 of the American Convention (or the analogous requirement implied into the American Declaration), at any point over individuals situated in the territory of Ecuador by reason of spraying conducted in Colombian territory, within the framework of the fight against illicit drugs, under a program created and implemented in accordance with Colombian law and subjected to strict audits and monitoring.

---

926 *Al-Skeini and Others v. The United Kingdom* [GC] (App. no. 55721/07), Judgement of 7 July 2011, paras. 133-140. Cf. in particular the Concurring Opinion of Judge Bonello paras. 10-20.

927 *Saldaño v. Argentina,* Inter-Am. C.H.R., Report No. 38/99, para. 17 (11 Mar. 1999).

(4) ECUADOR'S ARGUMENT BASED ON THE OBLIGATION TO "RESPECT AND ENSURE"

4.152. Finally, in an attempt to bypass the requirement of jurisdiction, Ecuador puts forward a distinction between the obligations contained in human rights treaties. It argues that the positive obligation to "ensure" the enjoyment of fundamental rights applies only in relation to individuals within the jurisdiction of the State, whilst the obligation to "respect" is not so limited and applies regardless of the existence of any jurisdictional link between the State and the individual. Illustrative is its assertion that "Even if indigenous peoples within Ecuador are not subject to the jurisdiction of Colombia, Colombia nevertheless has an obligation to respect their rights".[928]

4.153. Ecuador here relies on a particular reading of Article 1 of the American Convention, which is untenable in light of the case-law of the Inter-American human rights monitoring bodies. For instance, in a passage cited by Ecuador itself in its *Reply*, the Inter-American Commission noted in *Alejandre v. Cuba* that "[...] all the American states are obligated to *respect* the protected rights of any person *subject to their jurisdiction*".[929] Although that statement was admittedly made in the context of assessment of the scope of the obligations under the American Declaration, which contains no express clause dealing with its scope of application, it applies *a fortiori* to the obligations under the American Convention.

---

928 ER, para. 7.31

929 *Alejandre v. Cuba*, para. 23, quoted at *Reply*, para. 7.37.

4.154. Ecuador also makes a misplaced attempt to draw support from the ICCPR relying on the dictum of the Human Rights Committee to the effect that "it would be unconscionable to so interpret the responsibility under Article 2 of the Covenant so as to permit a state party to perpetrate violations of the Covenant on the territory of another state, which violations it could not perpetrate on its own territory."[930] But the decision of the Human Rights Committee concerned a very different set of facts, in which agents of the State had taken actions within the territory of another State and had exercised personal control over an individual by abducting and mistreating him. In such circumstances, the agents had undoubtedly exercised "jurisdiction" over the victim, even if the actions in question did not take place within the territory of the State. It was to that question that the observations of the Human Rights Committee were directed, and not to the situation such as that of the present case of alleged incidental interference with human rights of individuals not within the jurisdiction of the State.[931]

(5) ECUADOR'S FACT-FREE CASE BASED ON INDIGENOUS RIGHTS

4.155. Finally, Ecuador repeats its *Memorial* arguments as to the impact of the aerial spraying on indigenous people of the

---

930 ER, para. 7.31, citing *Lopez Burgos v. Uruguay.*

931 Cf. *Lopez Burgos v. Uruguay*, para. 12.3: "Article 2 (1) of the Covenant places an obligation upon a State party to respect and to ensure rights "to all individuals within its territory and subject to its jurisdiction", but it does not imply that the State party concerned cannot be held accountable for violations of rights under the Covenant which its agents commit upon the territory of another State".

region.[932] These were fully dealt with in the *Counter-Memorial*[933] and there is little to add.

4.156. Again the single most important point is Ecuador's assertion that "the daily life of indigenous peoples living on its side of the border had been particularly affected by Colombia; aerial spraying".[934] As was demonstrated in Chapter 3, there is simply no evidence of affect, still less particular affect on indigenous peoples.[935] That being so there is not even an arguable claim based on indigenous rights.

4.157. Ecuador also makes the following points:

- Indigenous peoples have a special status under international law;[936]
- There is evidence of harm, including "cultural harm" and harm to property;[937]
- There is no requirement that indigenous peoples be targeted for their rights to be infringed;[938]
- Colombia has special obligations towards indigenous peoples in Ecuador, including consultation.[939]

---

932 ER, paras. 7.53-7.79.
933 CCM, paras. 9.153-9.169.
934 ER, para. 7.53.
935 See above, Chapter 3, Sections C (3) *(b)* and *(d)*.
936 ER, paras. 7.54-7.59.
937 ER, paras. 7.60-7.66.
938 ER, paras .7.67-7.68.
939 ER, paras. 7.69-7.79.

4.158. As to the first of these, Colombia does not deny that indigenous peoples have a special status under international law. As Ecuador acknowledges: "In short, Colombia recognises through its own legal obligations that indigenous peoples benefit from special protection under both international and national law."[940] The Colombian constitutional regime has defined special areas and measures to ensure effective public participation of the indigenous communities, in addition to those set out for all Colombian nationals. For instance, they can elect two senators in national elections (Art. 171); the law may provide for the creation of a special electoral district to ensure representation of ethnic groups in the Chamber of Representatives (lower house of Congress) (Art. 176); indigenous territories are set up as territorial entities to be governed by councils formed and regulated according to the traditions and customs of their communities (Arts. 286, 329 and 330); and the Government must promote the involvement of representatives from these communities in decision-making processes concerning the exploitation of natural resources in their territories, in order for this activity to be carried out without prejudice to the cultural, social and economic integrity of the indigenous peoples (Art. 330). However, what is at issue in the present proceedings is whether the spray mixture used for the eradication of illicit crops in Colombia was deposited in Ecuador so as to cause damage.

940 ER, para. 7.54.

4.159. As to the second point, in Chapter 2, it was shown that the spray mixture cannot cause the damage alleged by Ecuador. As to the lack of hard evidence of harm, this has already been dealt with in Chapter 3. In fact, it was shown that, despite the false assertions of the witness statements – including those from members of indigenous communities – to the contrary, there was no spraying over Ecuadorian territory and therefore, much less over the territories of the indigenous communities in Ecuador. Furthermore, satellite imagery shows that there were no changes in vegetation cover in Ecuadorian territory following the sprayings in Colombia and, therefore, the alleged damages to crops in Ecuador did not occur. In sum, there is no credible evidence of harm – let alone cultural dissolution or damage to property – from spray drift. Indeed, in light of the facts including the scientific evidence, the suggestion is fantastic.

4.160. As to the third point, the issue of "targeting", the remarks made already on this subject apply here.[941] Ecuador accepts that "the spraying is not aimed or targeted at indigenous peoples" but argues that Colombia "nevertheless had an obligation to take adequate measures to minimise their impact".[942] Colombia does not suggest that indigenous rights can only be infringed by action deliberately targeting an indigenous group as such – although a measure aimed at a group to its disadvantage is more likely to be a breach that a measure of general application. The point is quite simply that

---

[941] See above, Section E (2) "Targeting": Ecuador's incomprehension of Colombia's case.

[942] ER, para. 7.68.

hypothetical, indirect and general effects of lawful measures taken in another State are inherently unlikely to violate indigenous rights, and there is no reported or unreported decision to the contrary. In any event, what is essential is that the occasional deposit in Ecuador of the spray mixture used in Colombia for the eradication of illicit coca crops, if there was any at all, would have been insignificant and therefore could not have affected indigenous peoples in Ecuador.

4.161. The fourth point concerns the question whether the government of one State owes special obligations to indigenous peoples in another State. In the *Counter-Memorial* Colombia noted – briefly – that the answer must in principle be no, having regard to the carefully formulated language of Article 27 of the ICCPR and Article 1 of ILO Convention 169.[943] The suggestion that Colombia had a special obligation to consult the indigenous people of Ecuador who live in the vicinity of the border is tantamount to an invitation to Colombia to intervene in the internal affairs of Ecuador. In *Pulp Mills*, the Court summarily rejected the suggestion that there was an obligation of transboundary consultation of communities on the other side of a boundary.[944] Having regard to the extreme sensitivity of relations between the State and its indigenous peoples, the same conclusion must apply *a fortiori* here.[945]

---

[943] CCM, paras. 9.159, 9.164.

[944] *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, *ICJ Reports 2010*, para. 216.

[945] In fact the Constitutional Court of Colombia in its decision SU-383 of 2003 upheld the right of indigenous peoples in Colombia whose lands

4.162. Finally, Colombia would note that Ecuador has not responded to the key point, that the well-known problems of the indigenous peoples of the region – whether they live 500 metres or 50 km from the border –are entirely its own responsibility.[946] To an external observer those problems do not get worse as one approaches the border. They have nothing to do with spray drift.

F. Conclusions

4.163. For the reasons set out above, the legal propositions on which Ecuador relies to found its claims based on: Colombia's alleged failures to exercise due diligence and comply with its assessment obligation; on the alleged violation of territorial sovereignty; on the alleged breach of international environmental law; and its human and indigenous rights case – remote from the facts as they are, in particular, because the spraying could not have caused the adverse effects alleged in Ecuador as shown in Chapters 2 and 3 – do not avail it. In particular:

---

would be oversprayed to prior consultation. The Court clearly stated that the right to prior consultation, provided for in ILO Convention 169, does not entail the right of indigenous and tribal peoples to veto the legislative and administrative measures that affect them. For further detail see CR, Vol. II, Annex 7, Zapata Report, paras. 55, 60.6. See also, CR, Vol. V, Annex 43: Minutes and Orders of prior consultation processes with indigenous communities, in compliance with the Colombian Constitutional Court's ruling SU-383.

[946] CCM, para. 9.173.

EIA AND THE ENVIRONMENTAL MANAGEMENT PLAN

(a) The PECIG was developed in strict compliance with Colombian regulations and with due diligence, including environmental impact assessments and other scientific studies that allowed it to establish that the PECIG did not pose any significant risk for human health and the environment.

(b) When Law 99 of 1993 creating the Ministry for the Environment and the National Environmental System was enacted, the aerial spraying of illicit crops throughout the national territory was already in place. Decree 1753 of 1994 authorized the continuity of projects or activities initiated in accordance with the regulations in force prior to Law 99 of 1993, and provided for the discretionary power of the environmental authority to request the submission of environmental management plans for such activities.

(c) In fact the Ministry for the Environment requested the National Narcotics Directorate to prepare and submit an EMP, a requirement that was complied with in 1998. The EMP was supplemented and formally adopted by the Ministry through Resolution 1065 of 2001, again in compliance with national law.

(d) In 2004 the highest administrative tribunal of Colombia, the Council of State, dismissed an action brought against the Ministry of the Environment seeking discontinuance of the aerial spraying program on the basis of an alleged transgression of environmental rights and obligations. This is dispositive of the lawfulness of the Program under Colombian law.

(e) The assessments carried out by Colombia concluded that there was no risk of significant harm from the aerial spraying activities. In other words, Colombia did conduct an EIA prior to the start of the spraying operations in the border area with Ecuador, and thereafter it continued to perform all the necessary monitoring activities to ensure compliance with the EMP, built on the basis of the EIA. By doing so, Colombia fully complied with its obligations of due diligence to take all reasonable steps to prevent any possible impact on human health and the environment.

(f) Colombia has conducted the PECIG with due diligence, having devoted significant resources to reviewing the potential environmental impact of the program and ascertaining whether it presented any significant risks to human and animal health and the environment.

(g) As to consultation with allegedly affected populations, in *Pulp Mills*, Argentina had argued that the EIA which had been carried out by Uruguay had been insufficient because it had not sufficiently consulted local populations in Argentina who might be affected by its operations. The Court disposed of that argument bluntly, simply stating that "no legal obligation to consult the affected populations arises for the Parties from the instruments invoked by Argentina."[947] The same is true here.

ECUADOR'S CLAIMS BASED ON VIOLATION OF TERRITORIAL SOVEREIGNTY

(h) The aerial spraying program in no way impinges upon Ecuador's territorial sovereignty or territorial integrity. On the contrary, permanently to prohibit Colombia from engaging in the program on its own territory, as Ecuador seeks to do, would seriously impinge on Colombia's sovereignty and would affect its capacity to comply with its international obligations in relation to the fight against drug trafficking.

ECUADOR'S CLAIMS BASED ON BREACH OF INTERNATIONAL ENVIRONMENTAL LAW

[947] *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, *ICJ Reports 2010*, para. 151.

(i) In fact Colombia did assess the impact of its proposed program, to the extent required by its own law – the standard laid down by this Court in *Pulp Mills*.[948]

(j) As to the remainder of these claims the necessary assumption underlying them is, again, that significant transboundary harm, above the relevant threshold, was caused by spraying activities in Colombia, *viz.*, by incidental drift of spray residues into Ecuador. But as Colombia has shown, there is no credible or reliable evidence of this. In the absence of such evidence, differences between the parties as to the status or content of particular norms do not arise for decision.

ECUADOR'S CLAIMS BASED ON HUMAN RIGHTS AND THE RIGHTS OF INDIGENOUS PEOPLES

(k) The linchpin of Ecuador's allegations of breach of human rights is the evidence of the witnesses put forward with the *Memorial*. But for reasons given in Chapter 3, the evidence of those witnesses is not deserving of credibility.

(l) In these circumstances, issues of human rights law – the question of "targeting", the territoriality

[948] *Pulp Mills on the River Uruguay (Argentina v Uruguay)*, *ICJ Reports 2010*, para. 205.

of human rights obligations, etc – are without incidence in this case.

(m) Finally, Ecuador repeats its *Reply* arguments as to the impact of the aerial spraying on indigenous people of the region.[949] These were fully dealt with in the *Counter-Memorial* and there is little to add. Again the single most important point is Ecuador's assertion that "the daily life of indigenous peoples living on its side of the border had been particularly affected by Colombia's aerial spraying."[950] As was demonstrated in Chapter 3, there is simply no evidence of affect, still less particular affect on indigenous peoples. That being so there is not even an arguable claim based on indigenous rights.

---

949 ER, paras. 7.53-7.79.

950 ER, para. 7.53.

Chapter 5

REMEDIAL ISSUES

A. Compensation

5.1. In the Submissions in its *Reply*, Ecuador requests the Court to declare that Colombia shall indemnify Ecuador for any loss or damage caused by its internationally unlawful acts, namely the use of herbicides by aerial dispersion, and in particular: (i) death or injury to the health of any person or persons arising from the use of such herbicides; (ii) any loss of or damage to the property or livelihood of such persons; (iii) violation of the human rights of such persons; (iv) violation of the special rights of indigenous peoples; (v) environmental damage or the depletion of natural resources; (vi) the costs of monitoring to identify and assess future risks to public health, human rights and the environment resulting from Colombia's use of herbicides; and (vii) any other loss or damage.[951]

5.2. Colombia has not committed an internationally unlawful act. Quite to the contrary, the PECIG is conducted in compliance with an obligation foreseen in the 1988 United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, in the framework of the fight against the world drug problem which all States are under a duty to contribute to. It is a Program established in accordance with Colombian law, that has been implemented with the required

[951] ER, Submissions, (B), p. 551.

due diligence, mindful of international standards. As has been shown, none of Colombia's international obligations were breached in the course of the Program's implementation within its territory in the border areas with Ecuador. In light of this, there is no element of unlawfulness in this case, as required by the law of State responsibility.

5.3. In Chapter 2, Colombia showed that the spray mixture does not, and, scientifically, cannot, cause the catalogue of harms alleged by Ecuador. It also showed that, even under worst-case conditions, there was likely either no deposit at all in Ecuador due to spray drift or that, at most, it was insignificant and well below the levels of concern for sensitive areas. It is clear that there was no damage caused in Ecuador.

5.4. Ecuador did not put forward any hard evidence of the damages it alleges. In Chapter 3, Colombia has shown that the witness statements and supposedly corroborating evidence on which Ecuador bases its claims are unreliable, scientifically implausible and in fact, falsified by the spray data.

5.5. Ecuador did not establish causation between the alleged damages and the sprayings in Colombia. Moreover, it did not adequately assess and dispose of the many different causes to which the alleged adverse effects could be attributed (i.e., to the mining, logging and African Palm oil industries, as a result of water and soil contamination due to the chemicals used in those activities, and the deficient health care and sanitation conditions in the border area).

5.6. Since no damages or causation have been established, Ecuador is not entitled to any compensation.

B. Other claims by Ecuador

5.7. In the *Counter-Memorial* Colombia made three major points as to the remedial situation:

(a) It is wholly inadmissible, in relation to claims for breaches of international law that are only actionable upon proof of damage above a certain threshold, to seek to postpone the question of damage to the quantum stage;[952]

(b) there is no basis in law or fact for Ecuador's buffer zone claim;[953]

(c) Ecuador's claim having failed for want of proof, the Court should simply declare that Ecuador's claims are rejected.[954]

5.8. In its *Reply*, Ecuador responded briefly as follows:

(a) It asserts that it has established its case on the merits and accuses Colombia of not citing the ILC Articles on State Responsibility in its *Counter-Memorial*.[955]

(b) It focuses from a remedial point of view on "procedural violations, which by definition

952 CCM, paras. 10.1-10.7.
953 CCM, paras. 10.8-10.11. CR, Chapter 2, Section C, above.
954 CCM, para. 10.12.
955 ER, para. 8.4.

cannot await a showing of actual harm in order to have become applicable and to have been violated".[956]

(c) It accuses Colombia of inability to distinguish breach from quantification of loss,[957] citing the *Nicaragua* and *Armed Activities* cases. The point is developed at length,[958] but is essentially as stated. Yet again Ecuador deprecates the approach taken in *Trail Smelter* (the only decided case at the international level involving transboundary air pollution), preferring the thoroughly "modern" approach of the UN Compensation Commission.[959] It also throws in *Diallo* for good measure – a case involving arbitrary expulsion and deprivation of property.[960]

5.9. These points can be dealt with in summary fashion:

(a) This is purely protestative pleading, and a further illustration of Ecuador's propensity to rely on (exaggerated renderings of) legal norms rather than facts. The factual position is as set out in Chapters 2-3 of this *Rejoinder*, and in the attached expert reports. It is significant that

956 ER, para. 8.4.
957 ER, paras. 8.6-8.7.
958 ER, paras. 8.8-8.12.
959 ER, para. 8.11.
960 ER, para. 8.12.

Ecuador still relies on the affidavit evidence annexed to its *Memorial*, despite the fact that its case has materially changed and that these affidavits have been seriously compromised and contradicted. As to the lack of any reference by Colombia to the ILC Articles on State Responsibility in its *Counter-Memorial*, these merely provide a remedial framework for the consideration of cases, whether good or bad. They are no substitute for facts established by credible evidence.

(b) It is true that "procedural" violations may not require proof of actual harm in order to establish a breach. But this depends on the particular violation and on the particular norm alleged to have been violated. It should be stressed that there is no treaty establishing mandatory procedures to be followed in relation to transboundary issues in the present case (unlike the position in *Pulp Mills*[961]). Moreover, as the Court held in that same case, "an environmental impact assessment [is required] where there is a risk that the proposed industrial activity may have a significant adverse impact in a

[961] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, Judgment of 20 April 2010. There is no equivalent here either to the River Uruguay Statute or the Commission.

transboundary context, in particular, on a shared resource."[962]

First of all, insofar as the evidence goes, Colombia's aerial spraying program *has not caused harm to Ecuador*. Indeed, Colombia showed that deposit of the spray mix in Ecuador due to drift, even assuming worst-case conditions, would have been zero or insignificant. Furthermore, Colombia has itself and through trustworthy associates assessed the risks, and has appraised the longstanding nationwide program repeatedly, prior to, during, and after the sprayings in the border area, finding that it did not pose a significant risk to human health or the environment, and indeed no adverse effects ensued. Therefore, a transboundary environmental impact assessment was not called for. In any event, an assessment or appraisal procedure designed to prevent harm should not be hypercritically judged if indeed no harm occurs and no undue risk is imposed, as in the case at hand. That would be to elevate form above substance.

(c) The present case concerns not detailed issues of quantification but whether substantial or significant harm (above the relevant threshold)

[962] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010*, para. 204.

has been caused or not. In cases of alleged transboundary harm by air pollution it is not enough to show that a certain chemical, not inherently harmful in any dose whatever,[963] has crossed the boundary (although Ecuador, for all its opportunities to take measurements over the years of spraying has not even shown that). It has to be demonstrated that the substance, lawful in its origins, has actually caused harm above the relevant threshold – that a breach has actually occurred. This is the gist of the cause of action and has nothing whatever to do with ascertaining quantum. It is true that in some cases the fact that quantifiable harm has been caused may be obvious, taken as read – where there has been, for example, the mining of a harbour or the looting of a province.[964] But – unless the Court is prepared to credit Mr Mestanza – there has been nothing like that in the present case. Ecuador is trying to get to a hypothetical quantum phase by sleight of hand.

5.10. More serious – because of their potentially serious implications for Colombia's sovereignty over its border regions

[963] This case has nothing to do with nuclear issues or radioactive fallout. *Australia v France, ICJ Reports 1974*, p. 253; *New Zealand v France, ICJ Reports 1974*, p. 457.

[964] In *Trail Smelter* the fact of substantial crop losses from high sulphur emissions was evident from the beginning and was well-documented in the pleadings: see (1938) 3 RIAA 1905; (1941) 3 RIAA 1938.

– are Ecuador's protestations that it does not seek to restrict that sovereignty.[965] But in truth, if Ecuador were to prevail in persuading the Court to declare a buffer zone precluding the spray program from being conducted in the border area, Colombia's sovereignty over the border region would be seriously impaired. The point – though no stronger than other remedial points made by Ecuador – thus requires more detailed scrutiny.

Ecuador's Buffer Zone Claim

5.11. The scientific merits of Ecuador's claim for the Court to establish a buffer zone in Colombian territory have already been discussed and dismissed.[966]

5.12. After two completed rounds of written pleadings, the evidence does not show *any* harm as having been caused, whether at a distance of 10 kilometres, 5 kilometres, 1 kilometre, or – in fact – at *any* distance. The evidence of Dr Hewitt is that spray drift in measurable quantities does not penetrate downwind more than – at most – a few tens of metres from the spray site.[967] The satellite imagery shows no evidence of spray drift in Ecuador and that, in any event, whatever spray drift there may have been did not cause defoliation in Ecuador.[968] The hundreds of studies on glyphosate on record with the EPA, and specific studies, such as those of CICAD I

---

965 ER, paras. 8.13-8.18.

966 See Chapters 2-3 above.

967 Chapter 2, Section C, above; and CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 32, p. 14.

968 CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011.

and II, the 2003 toxicity studies on the spray mixture contracted by the US Department of State and reviewed by EPA, as well as the evidence of Dr Solomon and Dr Dobson all show that the spray mixture could not have caused the catalogue of harms of which Ecuador complains.[969] It is highly material that harms of this type have not been caused in Colombia itself, where the spraying program has actually been conducted.

5.13. In short, Ecuador having comprehensively failed to make out its case on the merits, it is the Court's function simply to say so and to decline any substantive remedy, whether by way of a buffer zone or otherwise.

5.14. It is true that Colombia has for the most part since 2007 refrained from spraying within 10 kilometres of the border. But it has done so solely as a gesture of goodwill in light of the sometimes fraught relations between the two States.

5.15. A gesture taken in the interests of better relations between two States should not be converted into a commitment by repetition of words such as "reliance" and "representation", and in any event Ecuador does not suggest that it has suffered any detriment or materially changed its position by virtue of such "reliance".[970] On the contrary, it has relied on the likes of Victor Mestanza to maintain a spurious and scientifically incredible claim which has at times extended to the deaths of children and the destruction of cultures.

---

[969] CR, Vol. IV Annex 54; Vol. V, Annex 56; CCM, Vol. III, Annexes 116 and 131.

[970] ER, para. 8.14 is quite clear on this point.

5.16. Ecuador's submission to the effect of having the Court declare that Colombia shall "prohibit" aerial spraying "within 10 kilometres of the border with Ecuador", runs counter to the jurisprudence of the Court. In principle it is not for the Court to tell a party how precisely to comply with its judgment, and this is true even in respect of obligations of a far more precise character than those on which Ecuador relies. Many cases reflect this principle:

(a) In the *Haya de la Torre* case, there was a dispute between the parties as to the manner in which the Court's prior judgment in the *Asylum* case was to be implemented. Speaking of that judgment, the Court in *Haya de la Torre* commented:

> "The Court observes that the judgment confined itself, in this connection, to defining the legal relations which the Havana Convention had established between the Parties. It did not give any directions to the Parties, and entails for them only the obligation of compliance therewith. The interrogative form in which they have formulated their Submissions shows that they desire that the Court should make a choice amongst the various courses by which the asylum may be terminated. But these courses are conditioned by facts and by possibilities which, to a very large extent, the Parties are alone in a position to appreciate. A choice amongst them could not be based on legal considerations, but only on considerations of practicability or of political expediency; it is not part of the

> Court's judicial function to make such a choice."[971]

In the event, the Court declined to say how the parties were to give effect to the judgment, beyond affirming the holding in *Asylum* that unlawful asylum had to be terminated. But *how* it had to be terminated – there being more than one lawful way of doing so – was a matter for the parties (and notably for Colombia as the obligor under the *Asylum* judgment) and not for the Court. As the Court said:

> "The Court has thus arrived at the conclusion that the asylum must cease, but that the Government of Colombia is under no obligation to bring this about by surrendering the refugee to the Peruvian authorities. *There is no contradiction between these two findings, since surrender is not the only way of terminating asylum*.
>
> Having thus defined in accordance with the Havana Convention the legal relations between the Parties with regard to the matters referred to it, the Court has completed its task. It is unable to give any practical advice as to the various courses which might be followed with a view to terminating the asylum, since, by doing so, it would depart from its judicial function."[972]

Haya de la Torre is clear authority for the proposition that the Court will not particularise the method by

---

971 *Haya de la Torre case (Colombia/Peru) ICJ Reports 1950*, p. 79.

972 *Haya de la Torre case (Colombia/Peru), ICJ Reports 1950*, pp. 82-3 (emphasis added). The Court was unanimous.

which its judgment is to be implemented, if there is more than one lawful way of doing so.

(b) The Court has always acted consistently with this principle. For example in *LaGrand* the Court, having held that there had been a breach of the Vienna Convention on Consular Relations, had to deal with the consequences. It said:

> "The Court considers in this respect that if the United States… should fail in its obligation of consular notification to the detriment of German nationals, an apology would not suffice in cases where the individuals concerned have been subjected to prolonged detention or convicted and sentenced to severe penalties. In the case of such a conviction and sentence, it would be incumbent upon the United States to allow the review and reconsideration of the conviction and sentence by taking account of the violation of the rights set forth in the Convention. *This obligation can be carried out in various ways*. The choice of means must be left to the United States."[973]

(c) This passage was quoted twice with approval by the Court in the *Avena* case[974] where, equally, the Court ordered the United States…

> "to provide, *by means of its own choosing*, review and reconsideration of the convictions and sentences of the Mexican nationals referred to … by taking account

---

[973] *LaGrand (Germany v United States of America)*, *Judgment, ICJ Reports 2001,* pp. 513-514, para. 125 (emphasis added).

[974] *Avena and Other Mexican Nationals (Mexico v United States of America), Judgment, ICJ Reports 2004,* p. 59, para. 120; p. 62, para. 128.

> both of the violation of the rights set forth in Article 36 of the Convention and of paragraphs 138 to 141 of this Judgment."[975]

(d) Most recently, in *Application of the Interim Accord of 13 September 1995 (The Former Yugoslav Republic of Macedonia v Greece)*, the Court did not…

> "consider it necessary to order the Respondent, as the Applicant requests, to refrain from any future conduct that violates its obligation under Article 11, paragraph 1, of the Interim Accord. As the Court previously explained, "[a]s a general rule, there is no reason to suppose that a State whose act or conduct has been declared wrongful by the Court will repeat that act or conduct in the future, since its good faith must be presumed" (*Navigational and Related Rights (Costa Rica v. Nicaragua),* Judgment, I.C.J. Reports 2009, p. 267, para. 150)." [976]

Moreover this was despite an overwhelming majority of the Court in favour of responsibility and a relatively precise obligation not to object to membership.

5.17. In light of the Court's jurisprudence, the position is even clearer in the present case. In the hypothesis that Ecuador could establish – which it has failed to do, both in its *Memorial* and in

---

[975] *Avena and Other Mexican Nationals (Mexico v United States of America)*, Judgment, ICJ Reports 2004, p. 72, para. 153(9), (emphasis added). See also *Request for Interpretation of the Judgment of 31 March 2004 in the Case concerning Avena and Other Mexican Nationals (Mexico v. United States of America) (Mexico v. United States of America), Judgment, ICJ Reports 2009,* p. 17, para. 44.

[976] *Application of the Interim Accord of 13 September 1995 (The Former Yugoslav Republic of Macedonia v Greece), Judgment of 5 December 2011,* p. 47, para. 168.

its *Reply* – some measure of transboundary harm above the relevant threshold as a result of activities conducted by Colombia within its own territory, it is clear that the Court has always been careful to preserve the entitlement of the party to decide, in the first instance, which of several available methods that exist for giving effect to the Court's judgment is to be adopted.

5.18. The point can be made in another way. The obligation of due diligence on which Ecuador relies is an obligation of result – an obligation to take all reasonable measures not to cause transboundary harm to a neighbouring State. It does not give Ecuador the right to choose among the various means which might be adopted, if such was the case – *quod non* – to achieve the result. The choice of method is a matter for Colombia, not for Ecuador, nor even (with due respect) for the Court.

5.19. This is more particularly the case here given that there is no scientifically proven significant risk to human and animal health caused by the spray mixture. Moreover, it must be borne in mind that there are powerful countervailing interests at stake, including the interest of Colombia and of the international community in the fight against illicit drugs. These were explained in the *Counter-Memorial* and have not been refuted by Ecuador. It is – with all respect – not for the Court to grant, indefinitely, a right to Ecuador, amounting to a form of impunity for illegal coca producers from what is the most effective and secure method of suppression. By insisting on impunity within 10 kilometres of its border, Ecuador seeks to

recruit the Court in the fight against drugs – but on the wrong side, on the side of the producers, the unsavoury middle-men and their associates from illegal armed groups!

5.20. Such a zone, ordered by the Court, would be a haven for criminals and a clear infringement of Colombian sovereignty over its own territory.

Conclusion

5.21. For these reasons, Ecuador is not entitled to any of the relief it seeks in the present case and the Court should so declare.

SUMMARY

A. Introduction

1. In its pleadings Ecuador has portrayed a devastating image of the situation of its northern regions bordering Colombia, allegedly as a result of the drift from aerial spraying operations conducted by Colombia on its own territory between 2000 and 2007. This portrayal bears no relation to the facts.

2. In fact the spray flight data provide no support to Ecuador's witnesses. In many cases, the data show that there were no sprayings at the times mentioned by the witnesses. Even when sprayings did take place in Colombia at the relevant times, there was no spray deposition at all in Ecuador or – if any – it was insignificant.

3. Ecuador's claims have not been established as a matter of fact and cannot be reconciled with the scientific evidence. Contrary to its assertions, no damage was caused, and therefore there is no question of violations of the human rights of Ecuadorian nationals or the rights of indigenous communities as a result of the sprayings over illicit coca crops in Colombian territory.

4. Colombia has been at the forefront of the global efforts directed at drug eradication and interdiction. Colombia has acted in compliance with its international obligations, and in application of the principle of shared responsibility,

acknowledged by the international community. Waging this battle is an issue of national security for Colombia, in the defence of its democracy, its institutions and its nationals who have suffered for decades due to drug trafficking.

5. The Program is a nationwide one, not limited to border areas. Spraying operations have been conducted in 23 of the 32 Colombian provinces in exactly the same manner, and in compliance with the same parameters and regulations. There was no different procedure adopted in the border area with Ecuador between 2000 and 2007. All this has been done without registering adverse effects on human health, flora, fauna or the environment as a result.

6. Ecuador asserts that the aerial fumigations "have been ineffective as a means of stemming the cultivation of coca."[977] But according to the 2011 Report of the United Nations Office on Drugs and Crime, during the last ten years, Colombia succeeded in reducing the overall area within its territory under coca cultivation by 65.1%. As a result, while in 2000 73.8% of all the coca cultivation existing in the world was located in Colombia, in 2010 this percentage decreased to 38.2%. This successful campaign could certainly not have been accomplished without aerial spraying.

7. Ecuador has modified the requests made in its *Memorial* and added a request that the Court order a 10 kilometre buffer zone along the boundary between Colombia and Ecuador. But

977 EM, para. 2.54.

the scientific evidence shows that significant deposition due to drift is only an issue at most, tens of metres downwind of the spraying sites. It follows that the compulsory suspension of any sprayings within 10 kilometres from the common boundary is unnecessary, irrelevant and unacceptable.

B. Alleged Toxicity of the Spray Mixture and Drift

8. The scientific evidence confirms that the spray mixture used poses no significant hazard for human health and the environment. Ecuador has failed to prove otherwise or to substantiate any of the alleged damages. The evidence shows that, under the conditions in which spraying operations have been conducted, drift is only an issue, at most, tens of metres downwind of the application site, and therefore for analysis purposes only those spray events in the immediate vicinity of the border are relevant. Indeed, according to Dr Hewitt's modeling of relevant spray events closest to the border, these would have resulted in insignificant deposition values in Ecuador.

THE SPRAY MIXTURE

9. Ecuador maintains in its *Reply* that Colombia did not disclose the precise components of the spray mixture and that it misrepresented its alleged harmful effects on the human and natural environment. These are serious accusations to which Colombia takes strong exception.

10. In fact the spray mixture has been subject to comprehensive analyses carried out by the OAS CICAD, by the United States' EPA and the State Department. Since 2002 the US Secretary of State has been required to make an annual determination and report to the Committees on Appropriations of the US Congress that certain conditions are met.

11. The documentation obtained by Ecuador from US government sources includes six acute toxicity studies carried out in 2003 by an independent laboratory contracted by the State Department, and reviewed by the EPA. On the basis of the studies, the EPA classified the mixture as category III (mildly toxic) for eye irritation and category IV (slightly toxic) for all the rest. Ecuador ignores these studies altogether in its *Reply*.

12. The formula used in the mixture has been described since 2000 in public documents issued by the Ministry of the Environment, and in all the audits carried out by Colombia every year on a monthly basis. With regard to Ecuador's allegation that the spray mixture and its ingredients are highly toxic to humans and animals, this is contradicted not only by the findings of the studies conducted by the OAS CICAD, and those contracted by the US State Department and reviewed by EPA, but also by the analyses conducted in the field by the Ecuadorian and Colombian Scientific and Technical Commissions in 2004 as well as independent scientific data and field studies. All these scientific studies and analyses, as well as the expert reports attached to this *Rejoinder* (including those produced for the *Dyncorp* proceedings), confirm that the spray mixture used in

the Colombia aerial spraying program causes no significant adverse effects on humans, animals or the environment.

THE COMPOSITION OF THE SPRAY MIXTURE

13. Ecuador asserts that Colombia "never revealed [the] precise formulations or the identities of all the additives" used in the mixture and alleges that two additional, "highly toxic glyphosate-based formulations" were not disclosed.[978] These allegations have no merit.

14. It should be stressed that the glyphosate-based products used in the aerial spraying program have been approved in their entirety by the relevant Colombian agencies, i.e., the National Health Institute and the Agriculture and Livestock Institute, as well as by the US EPA on the basis of toxicity studies. The toxicity studies that Ecuador has chosen to ignore confirm that the composition of the spray mixture corresponds exactly to what Colombia has previously stated in these proceedings is the composition of the spray mixture used.

Glyphosate

15. The active ingredient of the mixture, glyphosate, is the most commonly used herbicide world-wide since 1971.

Cosmo-Flux 411F

16. The addition of surfactants to glyphosate is common practice and a large number of such formulations are sold to the

978 ER, paras. 2.15, 2.17.

public and used for agriculture and weed control in gardens and parks all over the world.

17. Ecuador affirms that the addition of Cosmo-Flux 411F makes the mixture more toxic.[979] But the surfactant Cosmo-Flux 411F was reviewed in the CICAD studies, and tested in the toxicity studies on the spray mixtures requested by the United States State Department and reviewed by the US EPA; no increased toxicity or significant adverse effects were found.

Other alleged ingredients

18. Other Ecuadorian allegations as to the content of the spray mixture are likewise shown to be erroneous.

PARAMETERS OF DRIFT

19. With the realistic modeling of drift from spray operations which takes proper account of all relative variables, including in particular the intercepting effect of the presence of vegetation immediately adjacent to the areas sprayed, it was shown that – even in the worst case scenario in terms of wind direction and wind speed – any potential deposition of spray drift in Ecuadorian territory would be well below *de minimis* levels and no damage could have been caused in Ecuador

Aircraft Speed and Height of Spray Release

20. On the basis of the full set of spray data, Ecuador attempts to suggest that multiple flights exceeded the

[979] ER, para 2.55.

operational parameters in terms of both aircraft speed and height of spray release, and that this necessarily must have resulted in massive deposition of spray mixture within Ecuadorian territory.

21. As regards the speed of the aircraft, first of all, it should be recalled that aircraft speed is not a parameter in the Program's EMP. However, a detailed analysis of the spray data reveals that only a tiny proportion of spray events in the relevant area close to the border were at speeds between 207 and 246 mph. In any case, individual modeling by Dr Hewitt of the fastest and closest events for each year shows that the amount of spray mixture deposited even at the closest point within Ecuadorian territory as the result of the most extreme events was so small as to be insignificant. Deposition from even these worst case events was well below the relevant levels of concern for animals and plants, and could not have caused the damage alleged by Ecuador.

22. As regards the height of spray release, it is to be emphasized that, contrary to the position Ecuador takes, there was no general absolute requirement under Colombian law that spraying should take place at below altitudes of 50 metres above ground level. Rather, 50 metres was foreseen by the EMP as the normal highest application altitude, subject to the presence of obstacles present in the target zones, in which case spraying at altitudes above 50 metres was permissible. In any case, within the relevant area for analysis close to the border, the vast majority of spray events took place at altitudes below 50 meters, only a small proportion (12.8%) of the spray events took place

at altitudes between 50 and 77 metres, and only 1.2% (51 spray events) were in excess of 77 metres. All those spray events took place at low speeds. Individual modeling by Dr Hewitt of the amount of deposition from the highest of those spray events and those above 77 metres closest to the border showed that deposition rates at the closest point within Ecuador territory was minimal and again, given the relevant levels of concern, was incapable of having caused damage of the kind alleged by Ecuador.

Pilot training and performance

23. Ecuador criticises the abilities and training of Dyncorp's pilots. Ecuador quotes isolated and fragmentary sentences taken out-of-context, from selected documents most of which pre-date the start of spraying operations in the border area with Ecuador, and which have no relevance at all for the present case.

Droplet Size

24. According to Ecuador, Colombia agrees that, in addition to aircraft speed and height of the spray release, droplet size "significantly contribute[s] to drift."[980]

25. Of the 3,917 spray events for which speed data was recorded in the relevant area, 3,561 recorded speeds under 333 km/h (207 mph). According to Colombia's expert, Dr Hewitt, this means that in all of these spray events, i.e., 90.9% of the total, median droplet size would have been larger than

[980] ER, para 2.134.

128 μm, which is optimal for interception by foliage of which there is plenty in this forested and vegetated area of Colombia, and within the range of droplet sizes typically used for targeting sprays to foliage in applications around the world for tree, vine and other leafed crops. In any case, the remaining 9.1% spray events were also modeled by Dr Hewitt and the resulting deposition rates were insignificant.

Application Rate

26. Out of all the spray events in the relevant area for which application rates were recorded, 1,522 were at or below 23.65 l/ha, the parameter included in the Environmental Management Plan of the program. Of the 913 spray events that recorded application rates exceeding the 23.65 l/ha figure, 552 (60.5%) did so by a margin of only 5%. Not a single event exceeded it by more than 20%. It should be recalled that, in any case, the presence of trees or foliage surrounding and downwind of the spray application swath acts as an effective barrier to filter out drift of spray.

27. In conclusion, <u>all</u> of these values, ranging between 0.05 g/ha and 1.22 g/ha, are below the level of concern for sensitive animal and plant species. As noted above, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops. This shows that no damage could have been caused in Ecuador.

Temperature, Humidity and Wind Conditions

28. In the conditions typical of the relevant area, the interaction between relative humidity and temperature does not result in increased drift risk. Over 90% of the spray deposits within 100 m of the swath edge and, as Dr Hewitt states, the levels of deposit downwind "rapidly approach zero within a few hundred meters". Even the smaller droplets that could be subject to drift would carry an insignificant amount of the active ingredient.

29. In the southern parts of Nariño and Putumayo provinces mild winds are prevalent (64% of daily records for 100 months between 2000 and 2008) and the mean wind speeds are in the order of between 1 m/sec and 2 m/sec, i.e., 3.6-7.2 km/h, low values. Further, meteorological analyses show that for most of the year, predominant winds in the border area blow from Ecuador towards Colombia and their speeds are low.

Alleged night-time spraying

30. Ecuador asserts that "the data collected by the spray planes confirm Colombia's night time spraying on a massive scale".[981] This is not true. No aerial spraying operations for the eradication of illicit crops in areas adjacent to the border with Ecuador have been conducted during night time. That the times recorded by the software used on the spray aircraft appear to indicate the contrary is due to a discrepancy caused by errors in the offset of the spray system's clocks.

---

[981] ER, para 2.147.

CONCLUSIONS ON DRIFT

31. Ecuador's arguments are built on the unwarranted assumption that the area up to 10-km adjacent to the border is the relevant area. However, as Colombia has shown, deposition due to drift effectively falls to zero within a few hundred metres. Thus, spray events at locations farther into Colombian territory are irrelevant for the analysis.

32. Furthermore, Colombia has demonstrated that even in the case of the highest, fastest and highest application rate recorded for spray events closest to the border, deposition due to drift in Ecuadorian territory was zero or insignificant and therefore could not have resulted in any of the damages complained of by Ecuador.

C. Ecuador has not Substantiated its Claims of Damage

33. Ecuador's case is that the damage has been caused by the deposition within its territory of the spray mixture as the result of drift from spraying operations within Colombian territory. The principal items of evidence supporting this position are the affidavits of local residents filed with the *Memorial*. But these witness statements are unreliable, uncorroborated by the spray data and contradicted by the scientific evidence.

34. Chapter 3 of this *Rejoinder* (together with the Appendix) consists of a detailed analysis of the allegations of each of the witnesses relied upon by Ecuador as to the date and location of spraying, in so far as these vital details can be discerned from

statements made in generally vague terms 8 years later. The spray data demonstrates that in relation to the allegations of the witnesses, there was no spraying in Ecuadorian territory or over the San Miguel or Putumayo border rivers, or even sufficiently close to the locations in which they claim they were present, that could have caused the harm alleged. In a significant number of cases, there was no spraying at all anywhere near the locations in question at the relevant times.

35. That conclusion is corroborated by expert analysis of satellite imagery, which demonstrates that spraying within Colombia did not cause any effects within Ecuador.

36. Ecuador puts forward no hard scientific evidence either of the deposition of the spray mixture within its territory, or of the damage it alleges occurred, or of causation. If the damage were as widespread as Ecuador alleges, there would have been ample evidence documenting the harm, including scientific and/or medical evidence and studies, photographs, and other images of the damage caused. This striking absence of detailed, contemporaneous evidence not merely does not support Ecuador's case, it actively undermines it.

37. Both the witness evidence and the supposedly corroborative evidence are not worthy of any credibility. In particular:

(a) The statements are not contemporaneous but produced for the purposes of this litigation.

(b) The circumstances in which they were produced are obscure and doubtful, including incongruous use of technical terms, shared statements which can be shown to be inaccurate, etc.

(c) The statements are clearly and demonstrably false as regards a large number of the allegations made. Notably:

- Insofar as certain of the witnesses allege that they were subjected to direct overspray, the spray flight data demonstrates clearly that their allegations cannot be true.

- Certain witnesses allege that the spraying resulted in the deaths of their children or other relatives. Yet Ecuador no longer makes this claim.

- Most witnesses allege having seen the spray planes engaged in spraying operations. But the locations given suggest that they could not have done, given the distances involved.

- The satellite imagery demonstrates that even in those cases in which spraying took place close to the border, no effects are visible within Ecuadorian territory.

- That evidence (satellite imagery) accords with the modeling of drift from the spray events by Colombia's expert (Dr Hewitt), which resulted in insignificant levels of deposit at the distances involved.

Ecuador's reliance on additional evidence

38. By way of corroboration Ecuador attempts to rely on what it suggests are corroborative contemporaneous reports of NGOs and press reports. But these are no more reliable than the witness statements. In particular:

- These are based on interviews with local residents, collected some time after the alleged events.

- As regards the report by *Acción Ecológica*, it is extravagant and unreliable.

- Many concern locations kilometres away from the border (e.g. Reina del Cisne or La Cóndor) which could not possibly have been affected by spray drift.

Satellite imagery

39. The expert analysis of satellite imagery (Dr Evans) provides still further strong countervailing evidence that spraying within Colombia did not result in any deposition of significant amounts of spray mixture within Ecuador and that

there was no damage to plants within Ecuadorian territory. In the areas alleged by the witnesses in the region of Salinas, for example, satellite imagery shows clearly that the spraying carried out in Colombia in December 2000 and January 2001 caused no discernible effects whatsoever within Ecuador.

40. To conclude, the falsity of the various allegations, when compared to the spray data, results most clearly from various wholly false allegations of overspray made by a number of the witnesses, and by other individuals. However, even in relation to the allegations of those witnesses who limit themselves to asserting that they observed planes spraying across the border in Colombia, and/or that they thereafter experienced adverse effects as a result of drift of the spray mixture, the spray data shows that those claims are not deserving of belief either. Again, the same is true as regards the similar claims of individuals reported in the secondary material. On this basis alone, Ecuador's case as to harm must fail.[982]

The scientific evidence

41. The scientific evidence tendered with this *Rejoinder* demonstrates that in any case, the spray mixture, given the location and manner in which it was sprayed, simply could not have caused the various effects alleged by Ecuador.

- All the available scientific evidence points to the conclusion that the spray mixture applied within Colombia did not reach Ecuadorian territory, at

[982] CR, paras. 3.306-3.307.

least in any significant quantities, and in any case, that it is simply incapable of causing the effects alleged by the various witnesses relied upon by Ecuador and the other supposedly supporting evidence.

- Ecuador's scientific witnesses speak in terms of possibility or potentiality, rather than in terms of any firm conclusion that the damage has in fact occurred.

- The reports relied upon by Ecuador are flawed in their approach, and are either based on incorrect assumptions, or misunderstand the relevant principles.

42. Given the modeling of drift carried out by Dr Hewitt, it is clear that spray drift from spraying within Colombia did not reach Ecuador in quantities capable of causing any damage to plants or animals.

43. In this regard, the modeling by Dr Hewitt of the "worst case" spray lines closest to the border resulted in predicted deposition rates of between 0.001 and 2.71 g/ha on the Ecuadorian bank of the border river. Those values are far below any relevant level of concern which has been suggested by either party.

44. There is an overwhelming body of scientific evidence which demonstrates that glyphosate in particular, and the

formulated spray mixture as used in the spraying program more generally, does not have significant toxicological effects for humans or animals. This is so even in relation to exposure resulting from direct overspray.

CONCLUSIONS: ECUADOR'S CASE ON HARM

45. The spray data on its own substantially falsifies Ecuador's case. Even in those few cases in which there was some spraying within Colombian territory close to the locations at which the witnesses allege they were present, the modeling of the closest individual spray lines shows that the quantities of spray mixture that could have reached even the closest point on the Ecuadorian bank of the river, let alone the location where the witnesses were located, were so small that it could not have caused the harms alleged. The expert scientific reports submitted as annexes to this *Rejoinder* show that:

(a) even as a result of direct overspray, let alone incidental exposure due to drift, the spray mixture is incapable of causing the catalogue of harms to human health alleged.

(b) the allegations of damage to farm animals are likewise demonstrably untrue; even exposure to large quantities of the spray mixture is incapable of causing deaths of domesticated animals, such as those alleged by the witnesses (chickens, cows, goats and horses).

(c) as to the alleged damage to plant life, the scientific evidence, combined with the evidence as to likely deposition rates even from those spray events closest to the border shows that the spray mixture could not have reached Ecuador in quantities such as to cause the harm alleged.

46. Not only must Ecuador demonstrate to the satisfaction of the Court that the harms it alleges did in fact occur, but it must also show that if there was any harm at all, that it was caused by deposition of the spray mixture as a result of drift from spraying within Colombia. But potential alternative causes of the health symptoms allegedly experienced by the witness are endemic in the border region, and Ecuador has done nothing to exclude them as causal agencies. It has also failed to exclude other causal agencies with regard to damages to crops or soil productivity, such as fungi and pathogens, and the inherent poorness of nutrients in Amazonian soils.

D. Legal Issues

47. The present case turns essentially on the questions of fact and evaluation dealt with in Chapters 2 and 3. From the conclusions drawn there, Ecuador's claim fails without any need to consider legal issues. However a brief account of these follows.

EIA AND THE ENVIRONMENTAL MANAGEMENT PLAN

48. Contrary to Ecuador's assertions in its *Reply*, the PECIG was developed in strict compliance with Colombian regulations and with due diligence, including environmental impact assessments and other scientific studies that allowed it to establish that the PECIG did not pose any significant risk for human health and the environment.

49. The National Narcotics Council announced the eradication strategy in 1992, including the spraying of illicit crops, following consultations with environmental, agricultural and health agencies, in full conformity with the legal provisions in force.

50. When Law 99 of 1993 creating the Ministry for the Environment and the National Environmental System was enacted, the aerial spraying of illicit crops throughout the national territory was already in place. Decree 1753 of 1994 authorized the continuity of projects or activities initiated in accordance with the regulations in force prior to Law 99 of 1993, and provided for the discretionary power of the environmental authority to request the submission of environmental management plans (EMPs) for such activities.

51. In fact the Ministry for the Environment requested the National Narcotics Directorate to prepare and submit an EMP, a requirement that was complied with in 1998. The EMP was supplemented and formally adopted by the Ministry through Resolution 1065 of 2001, again in compliance with national law.

52. Even before the implementation of the Environmental Management Plan, the PECIG was under continuous monitoring by several government agencies and was subject to external audit.

53. In 2004 the highest administrative tribunal of Colombia, the Council of State, dismissed an action brought against the Ministry for the Environment seeking discontinuance of the aerial spraying program on the basis of an alleged transgression of environmental rights and obligations. This is dispositive of the lawfulness of the program under Colombian law.

54. The assessments carried out by Colombia concluded that there was no risk of significant harm from the aerial spraying activities. Independent scientific analyses of the spray mixture used in the program and tests conducted by Ecuador itself on the ground in 2004 also excluded that the aerial sprayings presented significant hazards for human health and the environment. In other words, Colombia did conduct an environmental impact assessment (EIA) prior to the start of the spraying operations in the border area with Ecuador, and thereafter it continued to perform all the necessary monitoring activities to ensure compliance with the EMP, built on the basis of the EIA. By doing so, Colombia fully complied with its obligations of due diligence to take all reasonable steps to prevent any possible impact on human health and the environment.

55. Colombia has conducted the PECIG with due diligence, having devoted significant resources to reviewing the potential

environmental impact of the program and ascertaining whether it presented any significant risks to human and animal health and the environment. In this context, there have been studies on the PECIG Program prior to and following the year 2000, and the Program has continued to be subjected to continuous and rigorous monitoring.

56. The Colombian Government has held constant meetings and exchanges with the Ecuadorian Government with regard to the PECIG's development. Complaints of lack of consultation are unfounded.

57. As to consultation with allegedly affected populations, in *Pulp Mills*, Argentina had argued that the EIA which had been carried out by Uruguay had been insufficient because it had not sufficiently consulted local populations in Argentina who might be affected by its operations. The Court disposed of that argument bluntly, simply stating that "no legal obligation to consult the affected populations arises for the Parties from the instruments invoked by Argentina" (Judgment, para. 151). The same is true here.

58. In the present case, the national aerial spraying program had already been approved by 1993, and benefited from the transitional regime established by the 1994 Decree. There is no reason, and no basis, for this Court to take another view on a matter expressly referred to national law in *Pulp Mills*.

59. To summarize, in the present case assessments were carried out, compliant with national law, which considered the

risks and concluded they were acceptable, even *de minimis*. The body of scientific expertise, and the scientific data, annexed to this *Rejoinder* demonstrates that that assessment was essentially correct. It would be an arid and unrealistic finding for the Court to hold nonetheless that more should have been done when the only result would have been the confirmation of the assessments actually carried out – and fully vindicated by later inquiry.

ECUADOR'S CLAIMS BASED ON VIOLATION OF TERRITORIAL SOVEREIGNTY

60. In Chapter 5 of its *Reply*, Ecuador alleges that Colombia has "violated the duty to respect Ecuador's sovereignty".

61. As was argued in the *Counter-Memorial*, a case concerned with alleged harm caused by spray drift is not to be resolved by general deductions from sovereignty or territorial integrity. That core point is never satisfactorily addressed by Ecuador in its *Reply*.

62. The aerial spraying program in no way impinges upon Ecuador's territorial sovereignty or territorial integrity. On the contrary, permanently to prohibit Colombia from engaging in the program on its own territory, as Ecuador seeks to do, would seriously impinge on Colombia's sovereignty and would affect its capacity to comply with its international obligations in relation to the fight against drug trafficking.

ECUADOR'S CLAIMS BASED ON BREACH OF INTERNATIONAL ENVIRONMENTAL LAW

63. A further basis of complaint on the part of Ecuador is that Colombia has breached its obligations of due diligence to prevent transboundary environmental harm to Ecuador.

64. In fact Colombia did assess the impact of its proposed program, to the extent required by its own law – the standard laid down by this Court in *Pulp Mills*.[983]

65. As to the remainder of these claims the necessary assumption underlying them is, again, that significant transboundary harm, above the relevant threshold, was caused by spraying activities in Colombia, *viz.*, by incidental drift of spray residues into Ecuador. But as Colombia has shown, there is no credible or reliable evidence of this. In the absence of such evidence, differences between the parties as to the status or content of particular norms do not arise for decision.

66. In a significant passage Ecuador acknowledges Colombia's argument that the obligation of prevention does not entail "the elimination of all risk whatever".[984] But in the same paragraph of the *Reply* it seeks a response from Colombia that would "*eliminate* the risk of transboundary harm to Ecuador". In fact however, such calculations do not arise: the aerial spraying program is conducted with all care in Colombian territory, and the incidental, occasional and limited amounts of

---

983 *Pulp Mills on the River Uruguay (Argentina v. Uruguay), ICJ Reports 2010,* para. 205.

984 ER, para 6.59.

spray drift in no way affect Ecuadorian populations or the environment. There is thus no foothold for Ecuador's argument of breach of norms of international environmental law.

ECUADOR'S CLAIMS BASED ON HUMAN RIGHTS AND THE RIGHTS OF INDIGENOUS PEOPLES

67. The linchpin of Ecuador's allegations of breach of human rights is the evidence of the witnesses put forward with the *Memorial*. But for reasons given in Chapter 3, the evidence of those witnesses is not deserving of credibility.

68. In these circumstances, issues of human rights law – the question of "targeting", the territoriality of human rights obligations, etc – are without incidence in this case.

69. Finally, Ecuador repeats its *Rejoinder* arguments as to the impact of the aerial spraying on indigenous peoples of the region.[985] These were fully dealt with in the *Counter-Memorial* and there is little to add. Again the single most important point is Ecuador's assertion that "the daily life of indigenous peoples living on its side of the border had been particularly affected by Colombia's aerial spraying."[986] As was demonstrated in Chapter 3, there is simply no evidence of affect, still less particular affect on indigenous peoples. That being so there is not even an arguable claim based on indigenous rights.

---

985 ER, paras. 7.53-7.79.

986 ER, para. 7.53.

E. Remedial Issues

70. In these circumstances, Ecuador's claim fails and it is entitled to no remedy.

71. There is no case whatever for a "buffer zone" on Colombian territory, of any extent. Such a zone, ordered by the Court, would be a haven for criminals and a clear infringement of Colombian sovereignty over its own territory. Likewise, since neither the alleged damages, nor the issue of causation linking them to the sprayings in Colombia have been established, Ecuador's claims for remedies are unwarranted.

SUBMISSIONS

For the reasons set out in its *Counter-Memorial* and in this *Rejoinder*, Colombia requests the Court to adjudge and declare that the claims of Ecuador, as set out in the *Memorial* of 28 April 2009 and the *Reply* of 31 January 2011, are rejected.

Colombia reserves the right to supplement or amend the present submissions.

JULIO LONDOÑO PAREDES
Agent of Colombia

The Hague, 01 February 2012

APPENDIX

ANALYSIS OF ECUADORIAN WITNESS STATEMENTS AS TO TIMING AND LOCATION OF SPRAYING AND ALLEGED EFFECTS

APPENDIX

ANALYSIS OF ECUADORIAN WITNESS STATEMENTS AS TO TIMING AND LOCATION OF SPRAYING AND ALLEGED EFFECTS

A. Introduction

1. In the present Appendix, Colombia will address each of the Ecuadorian witness statements in turn in order to show that none of them are worthy of any credibility. However, first, it is important to note two relevant aspects with regard to the statements in general.

2. As Colombia will show further below, all the accounts contain almost identical elements which instead of contributing to their mutual corroboration as Ecuador suggests, rather evidence that they are part of a pre-prepared script. Those common elements mostly comprise a litany of alleged effects on human health, animals, plants, crops and soil, accompanied by statements as to never having experienced anything similar before, and final dramatic allegations. Doubtless, the statements are all very well crafted scripts, but their prefabrication is too obvious.

3. Additionally, all of the alleged effects on human health, animals, soil, plants and crops in Ecuador are contradicted, first and foremost, because there was no spraying on Ecuadorian territory and therefore no direct application of the spray mixture was conducted there. Moreover, because under the actual wind conditions in the relevant area[1] and at the distances involved, drift is not an issue even for plants and crops, as will be shown with the results of Hewitt's modeling for each witness statement in turn. But more importantly, because the spray mixture does not cause any of the alleged effects that the witnesses claim.

4. Indeed, in Chapters 2 and 3 of this *Rejoinder* Colombia has set out the scientific evidence that shows the lack of toxicological effects of the spray mixture for humans or animals.[2] Therefore, each of the alleged effects will now be addressed very briefly, in order to confront them with the scientific evidence, and show the general falsity in which all of the statements incur.

---

[1] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of The Nariño and Putumayo Border Zone With Ecuador*, 7 Dec. 2011 (hereinafter: IDEAM Climate Characterization (2011)).

[2] See CR, Vol. I, Chap. 2, sec. B and Chap. 3, paras. 3.340-3.358.

(i) Alleged impacts on human health

5. According to the statements, alleged impacts on human health usually include severe skin irritation and bumps appearing one or two weeks later, and lasting for weeks (some even claim that the effects lasted for 7 or 8 years), eye burning sensation, and, chiefly on children, headaches, vomit, fever and diarrhea.

6. In Chapters 2 and 3 of this *Rejoinder* Colombia demonstrated, in addition to the falsity of the statements, that the alleged effects are all belied by the scientific evidence, in particular: specific studies such as CICAD I and II; the Alpha, Bravo and Charlie tests (spray mixture); and several expert reports such as those submitted by Dr Solomon, Dr Hewitt, Dr Dobson, Dr Williams and Dr Krieger, which show that the spray mix does not pose a health risk for humans or animals.[3]

7. The toxicological studies conducted on the spray mixture used in Colombia's spray program, commissioned by the United States Department of State and reviewed by the EPA (Alpha, Bravo and Charlie), are particularly clear in this regard.[4]

8. Indeed, after applying the mixture directly on rabbits, in much greater doses than those derived from any conceivable exposure to aerial spraying, the dermal irritation study on the mixture identified as "Charlie" concluded that "under the conditions of the test, Spray-Charlie is considered to be a slight irritant to the skin of the rabbit"[5] and that a slight irritation appears and disappears within the 24-hour interval following the application.[6] The Alpha and Bravo studies reached similar conclusions.[7]

9. Moreover, after feeding the mixture used in the spray program to rats, they found that "[n]o mortality occurred during the limit test".[8] In fact, it is noteworthy that the studies

---

[3] CR, Vol. I, Chapter 3, paras 3.359-3.377.

[4] CR, Vol. V, Annex 56: U.S. EPA, Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia.

[5] CR, Vol. V, Annex 56-A: *Six Acute Toxicity Studies with Spray-Charlie,* SLI Study N° 3596.16, 20 Feb. 2003, p. 175.

[6] *Ibid.*, p. 175.

[7] "Exposure to the test article produced very slight erythema and very slight edema on 2/3 and 1/3 test sites, respectively, at the 1 hour scoring interval. The dermal irritation resolved on 2/3 test sites by 24 hour scoring interval and the remaining test site study day 7." CR, Vol. V, Annex 56-B: *Six Acute Toxicity Studies with Spray-Alpha,* SLI Study N° 3596.3, 3 Sep. 2002, p. 179; "Exposure to the test article produced very slight erythema on 3/3 test sites at the 1 hour scoring interval. The dermal irritation resolved completely on all test sites by study day 7." CR, Vol. V, Annex 56-C: *Six Acute Toxicity Studies with Spray-Bravo,* SLI Study N° 3596.10, 4 Sep. 2002, p. 178.

[8] CR, Vol. V, Annex 56-A: *Six Acute Toxicity Studies with Spray-Charlie,* SLI Study N° 3596.16, 20 Feb. 2003, p. 8.

found that "[b]ody weight gain was noted for all animals during the test period."[9] Hence, no such symptoms as headaches, vomit, fever and diarrhea occur even under direct application (which was never the case), either immediately or subsequently.

10. Some witnesses even claim to have suffered eye burning, and permanent or years-long effects in their eyes. These statements are also contradicted by the scientific evidence. The toxicological studies conducted on the spray-Charlie also observed that even under direct application of the spray mixture in a rabbit's eyes, in much greater doses than those derived from any conceivable exposure to aerial spraying, it only produced a mild irritation or conjunctivitis at the 1-hour scoring interval which resolved completely in all test eyes by the 24-hour scoring interval. The conjunctival irritation had resolved completely in all test eyes by Day 7 of the study.

11. Some witnesses go as far as to accuse offensively Colombia of allegedly causing children deaths in Ecuador with the sprayings. As stated above, the studies conducted over the spray-Charlie showed that no mortality in the animal test-subjects occurred during the test. The scientific conclusion on the impossibility of lethal effects derived from any conceivable actual exposure to the spray mix is so evident that Ecuador – having obtained the full record of these tests through FOIA requests to the United States Government – has had to acknowledge so in its *Reply*: "[t]rue, its effects on people might not necessarily be fatal…"[10]

(ii) Alleged loss of productivity/effects on soil

12. In Chapter 2, Colombia has demonstrated that the spray mixture does not cause the effects alleged by Ecuador. In Chapter 3, Colombia has shown that the witnesses' allegations are unreliable, and given the location and manner in which the spraying was conducted, the mixture could not have caused the alleged harms to plants.

13. According to the scientific evidence, crops can be planted or transplanted on the sprayed plot immediately after application. It is widely acknowledged that glyphosate does not have a long-lasting residual activity on soils. Its mean life on soils ranges from 1 to 4 weeks maximum; it does not act as a soil sterilizer and is not adsorbed by plant roots. According to the EPA: "Glyphosate adsorbs strongly to soil and is not expected to move vertically below the six inch soil layer; residues are expected to be immobile in soil. Glyphosate is readily degraded by soil microbes to AMPA, which is degraded to carbon dioxide."[11] CICAD I stated that glyphosate has a short-lasting biological activity on soils

[9] CR, Vol. V, Annex 56-A: *Six Acute Toxicity Studies with Spray-Charlie,* SLI Study N° 3596.16, 20 Feb. 2003, p. 8..
[10] ER, para. 2.4.
[11] EM, Vol. III, Annex 132, p. 4.

and water; it is not biomagnified, does not move along the food chain, nor does it seep from ground soil through to subterranean waters.[12] Besides, Colombia has already shown that, even in cases of direct overspray, recovery in vegetation cover occurs very fast.[13]

14. Additionally, as stated in the *Counter-Memorial*, "[t]here are no reports of effects on the soil function or fungi at soil concentration expected directly under the spray. There is, therefore, no risk for soils."[14] This is corroborated by the results of the monitoring tests conducted regularly on soil and water samples from spray sites in Colombia, where no traces of glyphosate have been found, thus confirming that the soil's physiochemical composition is unchanged.[15]

(iii) Alleged impacts on animals

15. The witnesses also incur in evident falsehoods in their assertions as to alleged adverse effects on animals as a result of spraying. In the script they tend to follow, they also claim that chickens were born or turned blind, others suffocated; pregnant cows had miscarriages; pigs, cows and horses lost their hair, and had skin lesions; and even allege that certain animal species have disappeared.

16. However, in Chapters 2 and 3 Colombia has also demonstrated that glyphosate is essentially non-toxic to farm animals. Indeed, in the toxicological studies conducted on the spray mixture,[16] none of these effects are even mentioned. On the contrary, after feeding the mixtures used in the spray program to rats, it was found that "[n]o mortality occurred during the limit test".[17] In fact, it is noteworthy that the studies found that "[b]ody weight gain was noted for all animals during the test period."[18]

17. Some of Ecuador's witnesses (Witnesses 2, 3, 5, 8, 10 and 12) also allege to have observed dead fish after the sprayings. Yet, even assuming direct overspray and exposure, it is scientifically impossible for glyphosate to accumulate in running water such as rivers and therefore, for fish to die as a result.

---

12 CCM, Vol. III, Annex 116, p. 35.

13 See CCM, Vol. II, Annex 70, Appendix 1; See also CR, Vol. V, Annex 58, Appendix: Implementation of the verification protocol January – July 1998, carried out October 18-23, 1998. Section 6: *Qualitative environmental evaluation of spraying and illegal crops,* Section 6.2.: Environmental Impact of Illegal Crops.

14 CCM, Vol. I, Appendix, para. 122, p. 547.

15 CR, Vol. IV, Annex 38: Records of Water Samples Analysis Results 2005-2007 in the framework of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG); CR, Vol. IV, Annex 39: Records of Soil Samples Analysis Results 2005-2008 in the framework of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG).

16 See above paras. 7-10

17 CR, Vol. V, Annex 56-A: *Six Acute Toxicity Studies with Spray- Charlie,* SLI Study N° 3596.16, 20 Feb. 2003, p. 8.

18 *Ibid.*, p. 8.

18. Moreover, as stated above, there was no spraying on Ecuadorian territory, and deposition due to drift was zero or insignificant as will be shown for each statement individually in the following section. Indeed, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha.[19] Hewitt modeled the closest spray events to the witnesses' locations and calculated deposition values between 0.001 and 2.71 g/ha. The evident conclusion is that no effects were caused in Ecuadorian territory.

19. The apocalyptic scenes described by Ecuador's witnesses are simply not possible, even in the event of direct application, as has been scientifically shown.

B. Further falsity in each of the witness statements

20. Having discredited the alleged effects, Colombia will now refer to each witness in turn in order to show further falsities found in their individual statements. The issue of the alleged effects on plants and crops will also be addressed in particular for each of the witnesses.

21. All the allegations of spraying over Ecuadorian locations, over the border rivers or close to the border contained in the witness statements submitted with Ecuador's *Memorial* are crossed-checked below against the spray data furnished to Ecuador by the Department of State.[20] Despite the vagueness of the testimony as to dates, or even particular years, Colombia has checked every probable year on the basis of the content of the statements and the locations referred therein. On the basis of this analysis Colombia will show that there was no overspray of Ecuadorian territory contrary to the allegations of several of the witnesses. Furthermore, in those cases where spray events were found in Colombian territory for the years in question, Colombia will show that the distances involved – between the spray events and the Ecuadorian bank on the border river or the witnesses' reported locations – were such as to render it scientifically impossible for *any* of the alleged damages and adverse effects in animals, plants and crops to have occurred.

---

[19] See CR, Vol. II, Annex 1: Dr A.J. Hewitt, Ph.D., *Response to Report "Spray Drift Modeling of Conditions of Application for Coca Crops in Colombia" by D.K. Giles*, *Jan. 2011"*, 1 Nov. 2011 (hereinafter: Hewitt Report – Response to Giles (2011)), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[20] All of the Witness Declarations rendered by persons living in Ecuador will be included in the analysis. There are no Witness Declarations numbered 15, 16, 24, 25 or 35 (see EM, Vol. IV, Table of Contents, pp. iii-iv). As for EM, Vol. IV, Annexes 225-233, since they consist of Declarations rendered by Colombian nationals, residing in Colombia, with regard to events in Colombia, they are outside the scope of the present dispute (CCM, Vol. I, paras. 1.24-1.25).

Witness 1

(EM, Vol. IV, Annex 189)

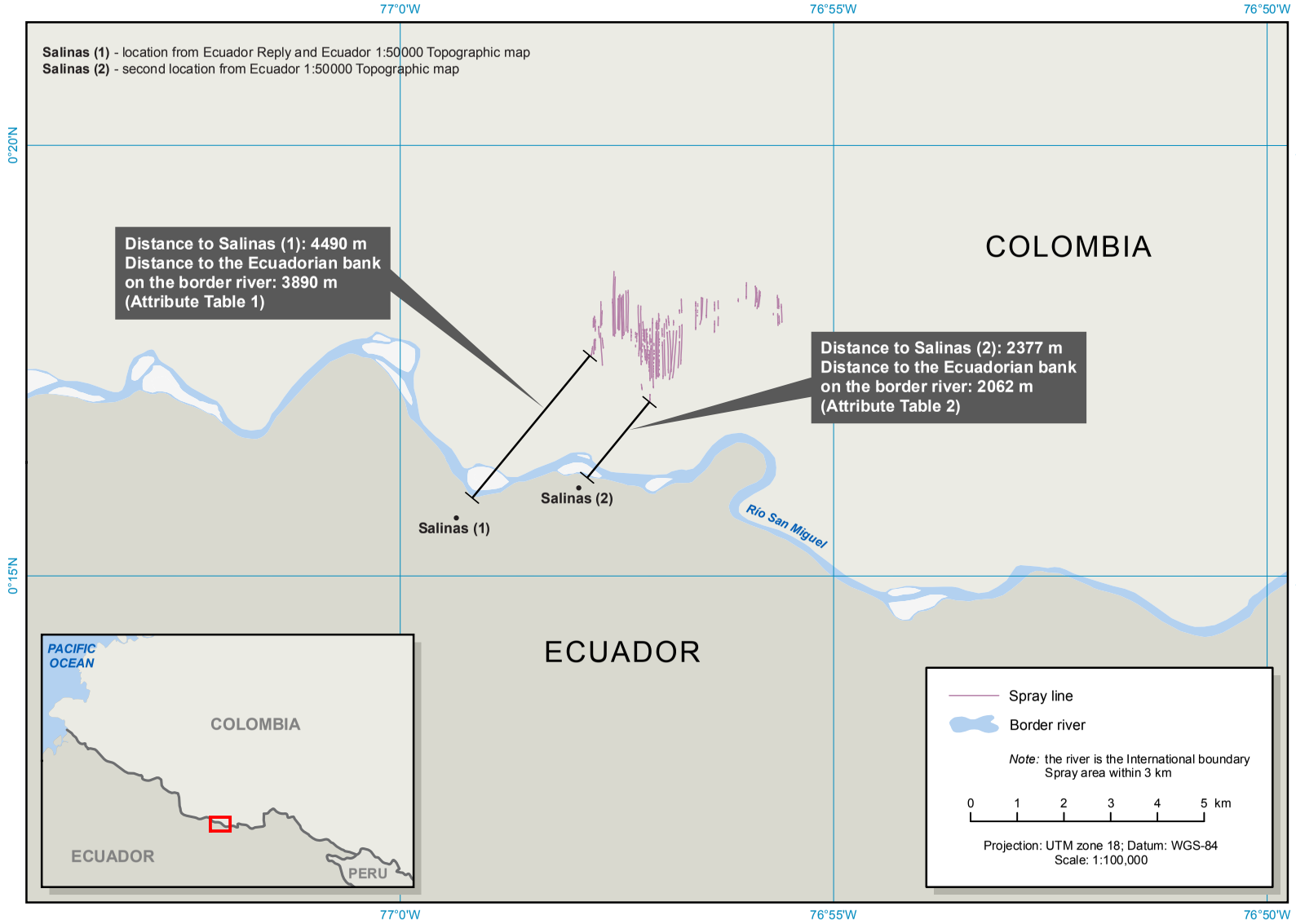


Figure 1. Salinas, Spray Lines in 2000 (Witnesses 1-2-3-6-7)

Salinas, 2000 (witness 1)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 1

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
5422	003293	13:44:19.25	1,200	37,88	185,820	11,700	1	91,270	1,200	10	9	9	100	l310cfcc	201,637	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		13:44	FEET		MILES/HOUR									31 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	299	66

Attribute Table 2

SALINAS 1:
Distance to Salinas location: 4,490 metres, over four kilometres.
Distance to the Ecuadorian bank on the border river: 3,890 metres, nearly four kilometres.

SALINAS 2:
Distance to Salinas location: 2,377 metres, over two kilometres
Distance to the Ecuadorian bank on the border river: 2,062 metres, over two kilometres

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.099 g/ha,[21] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[22] This shows that no damage could have been caused in Ecuador.

[21] CR, Vol. II, Annex 2: Dr A.J. Hewitt, Ph.D., *Aerial Spray Drift Modeling of Plan Colombia Applications*, 1 Nov. 2011 (hereinafter: Hewitt Spray Events Modeling (2011)), pp. 4-5, Table of Model Results, rows 69 and 53.

[22] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

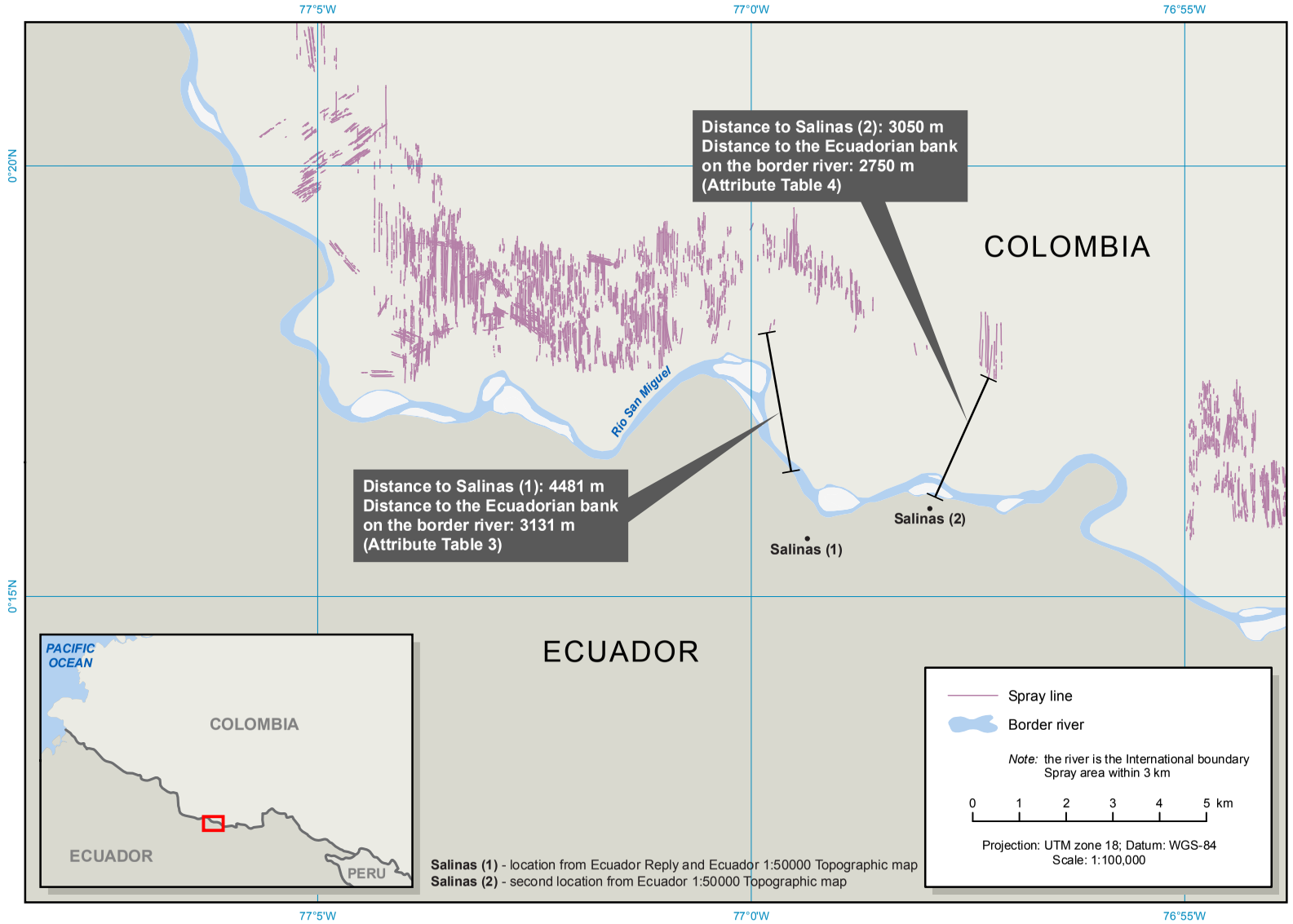


Figure 2. Salinas, Spray Lines in 2001 (Witnesses, 1-2-3-4-5)

Salinas, 2001 (witness 1)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2001 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
13644	002771	07:36:22.30	1,200	502,57	165,120	9,600	2	0	1,800	11	11	0	-1	a041j#ac	0	0101	50	Coca	T-65	a041j#ac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		07:36	FEET		MILES/HOUR									04 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	295	70

Attribute Table 3

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2001 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
14039	001711	12:18:52.05	1,200	215,84	156,040	11,700	1	0	0,900	11	9	0	-1	a051djdc	0,006	0101	50	Coca	T-65	a051djdc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:18	FEET		MILES/HOUR									05 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	286	79

Attribute Table 4

SALINAS 1:
Distance to Salinas location: 4,481 metres, over four-and-a-half kilometres.
Distance to the Ecuadorian bank on the border river: 3,131 metres, three kilometres

SALINAS 2:
Distance to Salinas location: 3,050 metres, over three kilometres
Distance to the Ecuadorian bank on the border river: 2,750 metres, nearly three kilometres.

Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha,[23] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[24] This shows that no damage could have been caused in Ecuador.

[23] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.
[24] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 1:

The witness states that he has lived in the community of Salinas, on the border of the province of Sucumbíos, Ecuador, for thirty years. He says that his farm starts on the banks of the San Miguel River.[25]

Salinas, according to the location provided in the Ecuadorian *Reply*,[26] hereinafter referred to as Salinas 1, is located approximately 1.07 km from the border. However, according to satellite images there is no village in that location. Therefore, in the interest of completeness and to dispel any doubts, Colombia has also located the closest community on satellite images, hereinafter referred to as Salinas 2, located at 2.7 km from Salinas 1. This location is over half-a-kilometre off the Colombian bank of the border river.

Though the witness states that "he has experienced border sprayings in his village several times – even twice a year", he refers mostly to the alleged effects of the "first time that aerial sprayings began", when he was in the shore of the river.[27]

Given that the witness says nothing with regard to the approximate date of "[t]he first time that aerial sprayings began", in an effort to determine whether the testimony has any basis, Colombia infers that he must have been referring to 2000 or 2001, as those were the first years when spraying operations took place closest to the witness'slocation.

According to the Spray Data from the Department of State, that Ecuador places such reliance on, containing the records for all the spray events, in 2000, the spray event closest to the border was at a distance of 4,500 metres from Salinas 1, and 3909 metres, i.e. nearly four kilometres from the Ecuadorian bank on the border river. The spray event closest to Salinas 2 that same year was at a distance of 2,392 metres from the community and 2,091 metres from the border (see Figure 1). In 2001, the spray event closest to the border was at a distance of 4,563 metres from Salinas 1, and 4,002 metres from the Ecuadorian bank on the border river. The spray event closest to Salinas 2 that same year was at a distance of 3,065 metres, i.e over two kilometres from the community and 2,777 metres from the border (see Figure 2).

All of these events were sprayings on Colombian territory, at distances of between nearly 3 and 5 kilometres of the two Salinas locations, and yet the witness claims that "[t]he planes flew along the edges of the river, some *spraying as far as the riverbank*", and that he "also sensed a strange odor." The falsehood is evident.

---

25 EM, Vol. IV, Annex 189.
26 ER, Vol. I, figures 2.4, 2.6, 2.11, 2.13, 3.3.
27 EM, Vol. IV, Annex 189.

The witness further alleges that soon after the spraying, his crops started turning yellow and dying. However, there was definitely no spraying on Ecuadorian territory and therefore no direct application of the spray mixture was conducted there. Additionally, under the actual atmospheric conditions in the relevant area[28], the plausibility of drift going south towards Ecuador is unlikely. But, more importantly: drift in fact is not an issue at the distances involved. Indeed, Hewitt modeled these events under actual spraying conditions and estimated deposition values of 0.01 g/ha, 0.099 g/ha, 0.106 g/ha and 0.167 g/ha, respectively.[29] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[30] This shows that no damage could have been caused in Ecuador.

This was further confirmed with satellite imagery of the time of the first sprayings in the area, which shows that very little change in vegetation condition occurred and that the changes identified were merely a result of normal agricultural activities, contrary to what the witness states.[31]

Although the falsity of the testimony has been shown, it is relevant to recall that all the alleged effects claimed in this statement are all contradicted by the scientific evidence.[32] Furthermore, all the elements contained in the statement are almost identical to those of the other witness statements, evidencing that they are part of a pre-prepared script. Those elements are the following:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “I got a terrible skin irritation a week or two after the planes came by. I broke out in a rash all over my body, and it itched. It was so severe that I had to go to Lago Agrio to seek treatment.” “My two nephews were also sick with itching. My son [REDACTED] also got sick with blisters that were like little water bubbles. They itched a lot and it seemed as if they were about to bleed when he scratched.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “Every time they sprayed, the children had diarrhea and fever, in addition to the itching.”

---

[28] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[29] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69, 53, 51 and 44, respectively.

[30] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[31] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; “[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities”, *Ibid.*, para. 3.77, p. 73.

[32] See above paras. 5-19.

- Loss of crops, and plants turning yellow. “Soon after the spraying, my crops started turning yellow and dying. The tallest fruit trees, such as the *zapote*, were the first ones to be affected. These tall trees were the first to dry up at the top. They did not die completely although they did dry up, and no longer produced fruit. The plantain trees were also destroyed quickly. The plantain, planted next to my house, which is a few meters from the river, died first. The plant was undernourished, falling to one side, and the fruit started to die. My coffee also had spots. The plantain finally turned black. The pastures were also lost, the grass turned yellow and died.”
- Effects on soil and subsequent loss of productivity measured in quintals. “Before the sprayings began in our area, I used to sell a lot of coffee. I had sixteen (16) hectares planted with coffee, and each hectare produced sixty (60) to eighty (80) quintals of the product annually. Now, I can barely harvest eight quintals of coffee per hectare each year.”
- Alleged impacts on animals. “The few livestock that I had were also affected a week or two after the first spraying. The few that survived did not escape being sick in the next sprayings. A cow that had never been sick before had a spot on her back as if it were scabies and part of it peeled completely; she had no skin and the flesh could be seen, it even looked as if it was going to bleed.” “The pregnant cows were not able to have normal offspring. One calf was born ahead of its time and dead. Three other were born undernourished and a few weeks after birth they all died. A pig also got sick, which lost its hair; the hair fell off gradually, until almost all the hair on its back was gone.”
- He/she had never experienced anything similar before. “A cow that had never been sick before had a spot on her back […]”
- Final dramatic statements. “I have been strong so as to resist. But it is hard to see all your efforts wasted without having any fault. I have given all my youth to my farm. All my efforts, since I was seventeen years old, have been invested in my land and plants. To lose it all in a few days has been very difficult. And, restarting and replanting, knowing that the loss would return every time I saw those planes spraying near my house, has been even harder”.

Witness 2

(EM, Vol. IV, Annex 190)

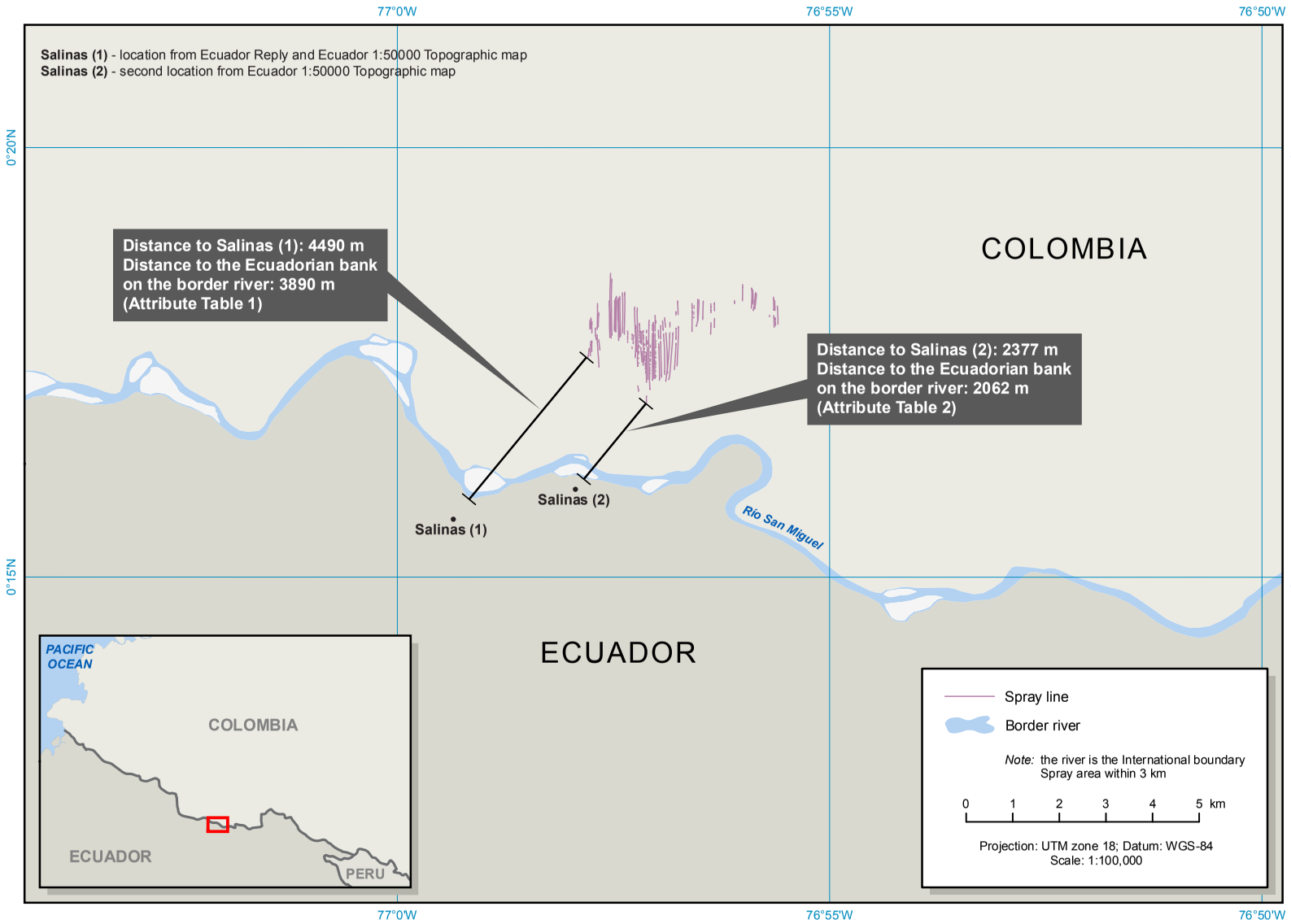


Figure 1. Salinas, Spray Lines in 2000 (Witnesses 1-2-3-6-7)

Salinas, 2000 (witness 2)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 1

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
5422	003293	13:44:19.25	1,200	37,88	185,820	11,700	1	91,270	1,200	10	9	9	100	l310cfcc	201,637	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		13:44	FEET		MILES/HOUR									31 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	299	66

Attribute Table 2

SALINAS 1:
Distance to Salinas location: 4,490 metres, over four kilometres.
Distance to the Ecuadorian bank on the border river: 3,890 metres, nearly four kilometres.

SALINAS 2:
Distance to Salinas location: 2,377 metres, over two kilometres
Distance to the Ecuadorian bank on the border river: 2,062 metres, over two kilometres

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.099 g/ha, respectively.[33] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[34] This shows that no damage could have been caused in Ecuador.

[33] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53.
[34] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

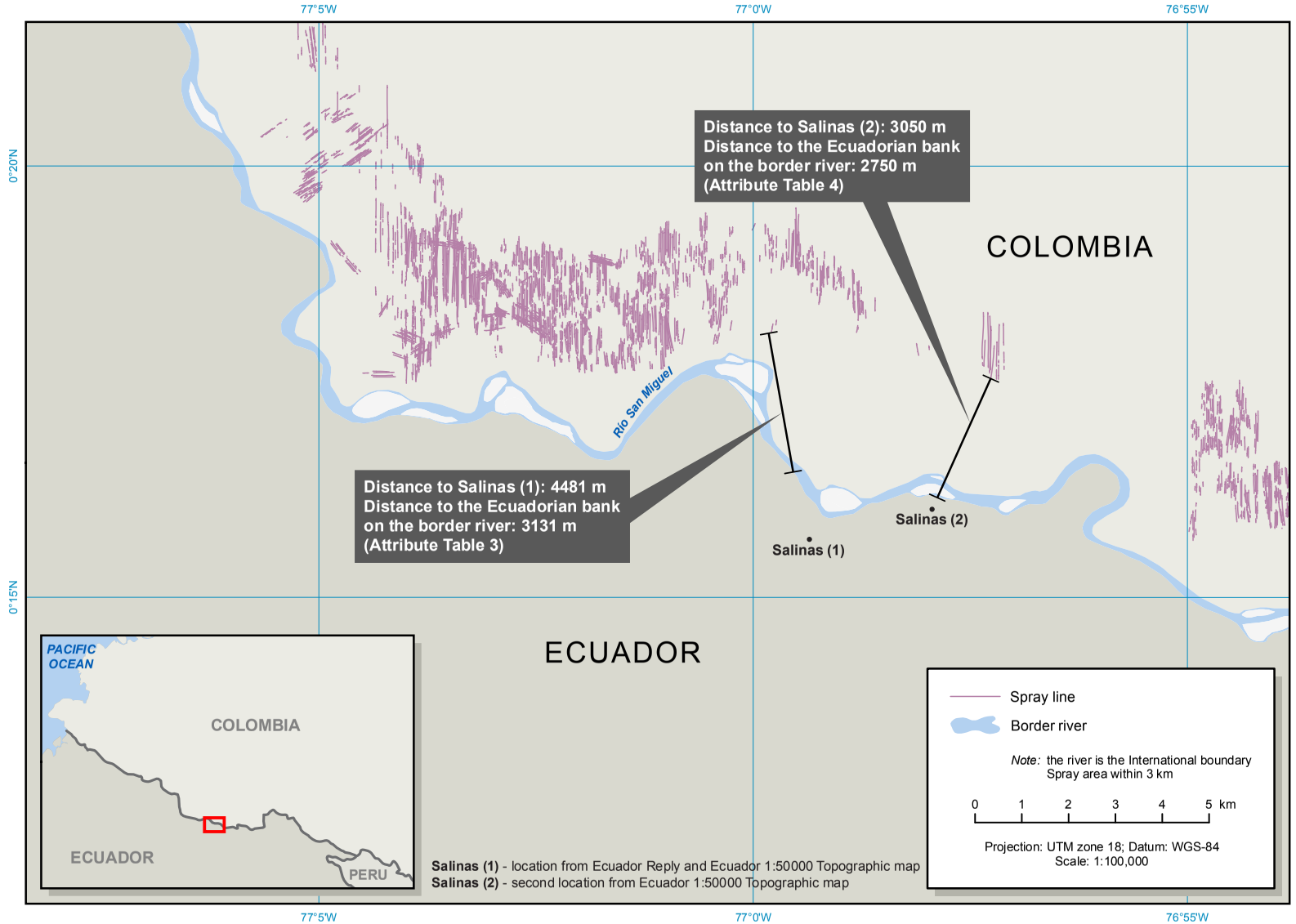


Figure 2. Salinas, Spray Lines in 2001 (Witnesses, 1-2-3-4-5)

Salinas, 2001 (witness 2)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
13644	002771	07:36:22.30	1,200	502,57	165,120	9,600	2	0	1,800	11	11	0	-1	a041j#ac	0	0101	50	Coca	T-65	a041j#ac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		07:36	FEET		MILES/HOUR									04 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	295	70

Attribute Table 3

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
14039	001711	12:18:52.05	1,200	215,84	156,040	11,700	1	0	0,900	11	9	0	-1	a051djdc	0,006	0101	50	Coca	T-65	a051djdc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:18	FEET		MILES/HOUR									05 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	286	79

Attribute Table 4

SALINAS 1:
Distance to Salinas location: 4,481 metres, over four-and-a-half kilometres.
Distance to the Ecuadorian bank on the border river: 3,131 metres, three kilometres

SALINAS 2:
Distance to Salinas location: 3,050 metres, over three kilometres
Distance to the Ecuadorian bank on the border river: 2,750 metres, nearly three kilometres.

Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha,[35] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[36] This shows that no damage could have been caused in Ecuador.

[35] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.
[36] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

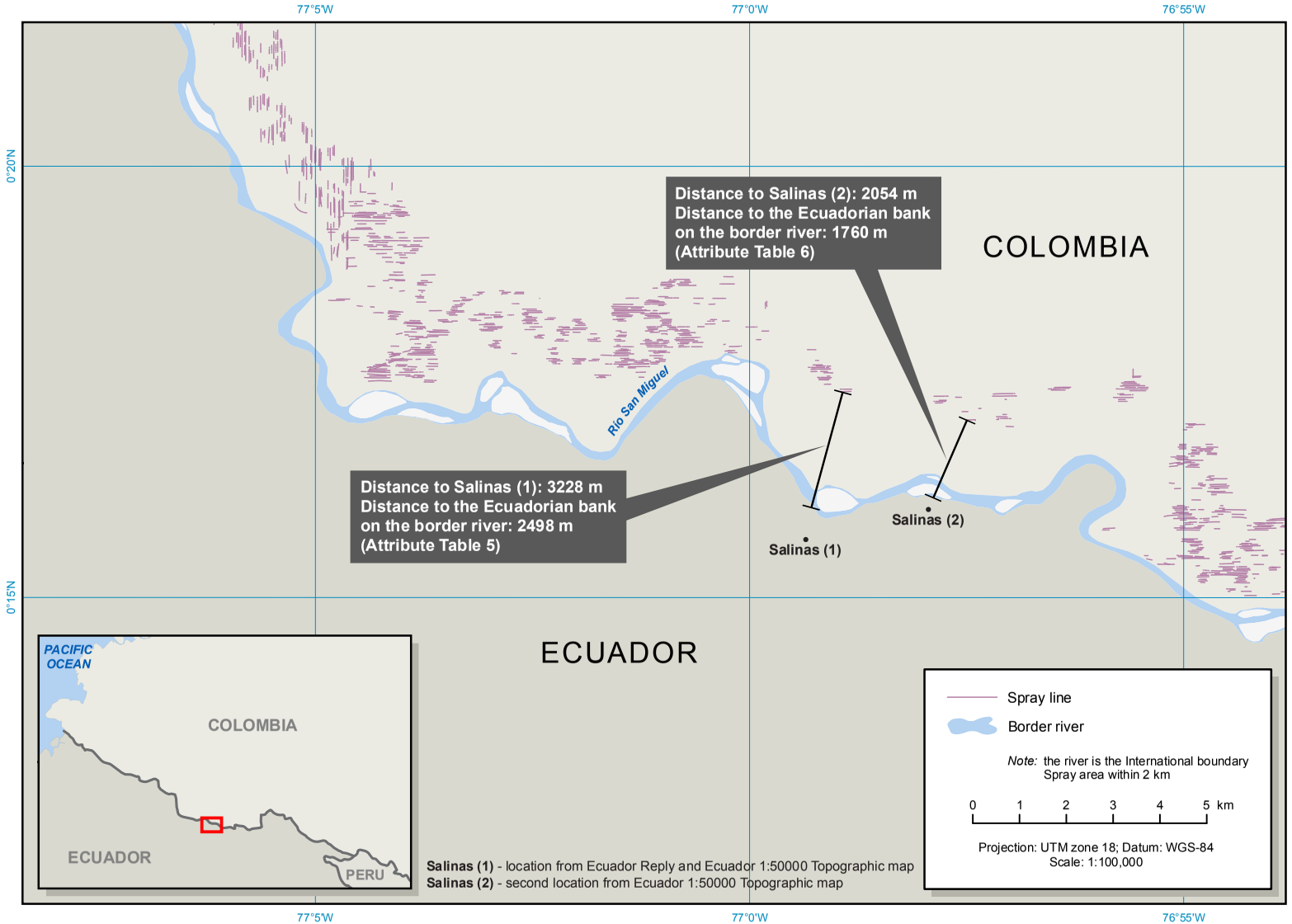


Figure 3. Salinas, Spray Lines in 2002 (Witnesses 2-3)

Salinas, 2002 (witness 2)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2002 (Witnesses 2-3)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
21443	914	I082EZBC.B99	301-2	Right	34	12:15:30:70	0.28979779	-76.98222492	1097	0,770	0,1	25,6	4,700	174,5	0	0	I082EZBC	7,8	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		08 September 2002				12:15			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
333	285	48

Attribute Table 5

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2002 (Witnesses 2-3)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
23513	2994	I082KBCC.B99	301-1	Right	54	18:40:28:07	0.28433029	-76.95826520	1047	0,890	0,2	51,4	10,500	152,400	0	0	I082KBCC	15,951	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		08 September 2002				13:40			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
318	282	36

Attribute Table 6

SALINAS 1:

Distance to Salinas location: 3,228 metres, over three kilometres.

Distance to the Ecuadorian bank on the border river: 2,498 metres, nearly two and a half kilometres.

SALINAS 2:

Distance to Salinas location: 2,054 metres, over two kilometres.

Distance to the Ecuadorian bank on the border river: 1,760 metres, nearly two kilometres.

Hewitt modeled these events and estimated deposition values of 0.11 g/ha and 0.015 g/ha, respectively.[37] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[38] This shows that no damage could have been caused in Ecuador.

[37] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 49 and 68.

[38] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 2:

The witness states that he has lived in Salinas, province of Sucumbíos, for 27 years, and his farm is located on the banks of the San Miguel River, which separates Ecuador from Colombia. According to the witness, the first fumigations that allegedly caused effects took place 7 or 8 years before the date of his statement, which was rendered on 16 January 2009.[39]

In a verification effort, on such a vague basis, Colombia infers that the witness must have been referring to 2000, 2001 or 2002 as "the first fumigations". Indeed, according to the Spray Data from the Department of State, and as shown in Figures 1, 2 and 3, the spray events closest to Salinas 1 in those years were at 4,500 metres, 4,563 metres and 3,248 metres from the community, respectively; and 3,909, 4,002 and 2,540 metres from the Ecuadorian bank on the border river. For the same years, the closest spray events from Salinas 2 were at distances of 2,392 metres, 3,065 metres, and 2,070 metres from the community, and 2,091, 2,777, and 1,790 metres from the Ecuadorian bank on the border river.

All of these events were sprayings on Colombian territory, at distances of between 2 and nearly 5 kilometres of the two Salinas locations, and yet the witness claims that "[t]he planes were flying, dropping a white liquid that with the wind came quickly toward us. The product had a strong odor […]". He also claims loss of crops and alleged effects on plants: "On my farm I had planted plantain, yucca and coffee. The first spraying destroyed everything."

None of these alleged effects are possible not only because of the distances involved. Meteorological analyses also show that for most of the year, predominant winds in the border area blow from Ecuador towards Colombia and their speeds are low.[40] This can be clearly seen in the multiannual average for Median Wind Speed, in Colombia's Atlas of Winds and Eolic Energy.[41]

Anyway, Hewitt also modeled these events considering actual spraying conditions. He estimated downwind deposition values of 0.01 g/ha, 0.099 g/ha, 0.106 g/ha, 0.167 g/ha, 0.11 g/ha and 0.015 g/ha, respectively.[42] As already noted above, the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and

---

[39] EM, Vol. IV, Annex 190.

[40] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[41] Available at: https://documentacion.ideam.gov.co/openbiblio/Bvirtual/019813/Capitulo1.pdf, p. 33.

[42] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69, 53, 51, 44, 49 and 68, respectively.

between 36 and 1,958 g/ha for various crops.[43] Definitely no damage, not even for plants and crops, could have been caused in Ecuador (or Colombia, for that matter).

Furthermore, the witness'sallegations with regard to crops and plants were also confronted with satellite imagery of the time of the first sprayings in the area. From the analysis it is possible to conclude that very little change in vegetation condition occurred in the Salinas area and that the changes identified were merely a result of normal agricultural activities.[44]

Thus, the statement's falsehood is evident. Under actual wind trends in the area and at the distances involved, the spray mix could not have possibly travelled and reached the witness'slocation to the amount that an odor could have possibly been sensed, or effects on plants could have been produced. All the witness'sclaims are thus contradicted.

Finally, Colombia cannot abstain from showing to the Court the statement's pattern which clearly evidence that, as all the statements, it has been previously set up.

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "[A]t the same moment, I felt burning in my nose and throat. A few days later, my body broke out with bumps that itched intensely." "I still have the scars from those bumps."
  - Eye burning/Chiefly on children: headaches, vomit, fever and diarrhea. "I also suffered from strong headaches and dizziness a few weeks after the planes came by spraying." "During each spraying, the children in the community and neighbors that also live on the banks of the river became sick with diarrhea and vomiting."
- Loss of crops, and plants turning yellow. "On my farm I had planted plantain, yucca and coffee. The first spraying destroyed everything. The plantain leaves turned yellow, they started to bend until they fell off. The plantain and yucca dried up faster than the coffee."
- Effects on soil and subsequent loss of productivity measured in quintals. "Before, I could get about twenty-five quintals of coffee per hectare, then after the sprayings, I do not even get three. After a while, I replanted, but the plants did not produce as before. The plantain, when looking at it, seemed nice, green, but once it was cut, inside it was in a poor state and inedible. Before, I could get about sixty quintals of maize, but after the sprayings, I do not even get five."

---

[43] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[44] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

- Alleged impacts on animals. “In the days after the sprayings, dead fish started to appear, especially *bocachico* and shad. In the past years, animal species have disappeared. Before, we used to see a lot of monkeys and parrots around the farm and in nearby mountains. Now, one seldom sees a monkey or a parrot.” “[T]he animals lost their hair and died. Fifty percent of my chickens died, the same with the fish.”
- He/she had never experienced anything similar before. “Never before did I have this type of bumps all over my body […]”.
- Final dramatic statements. “People have nothing to eat and we have no one to turn to. What used to be paradise for us has become a hell from which we cannot escape”.

Witness 3

(EM, Vol. IV, Annex 191)

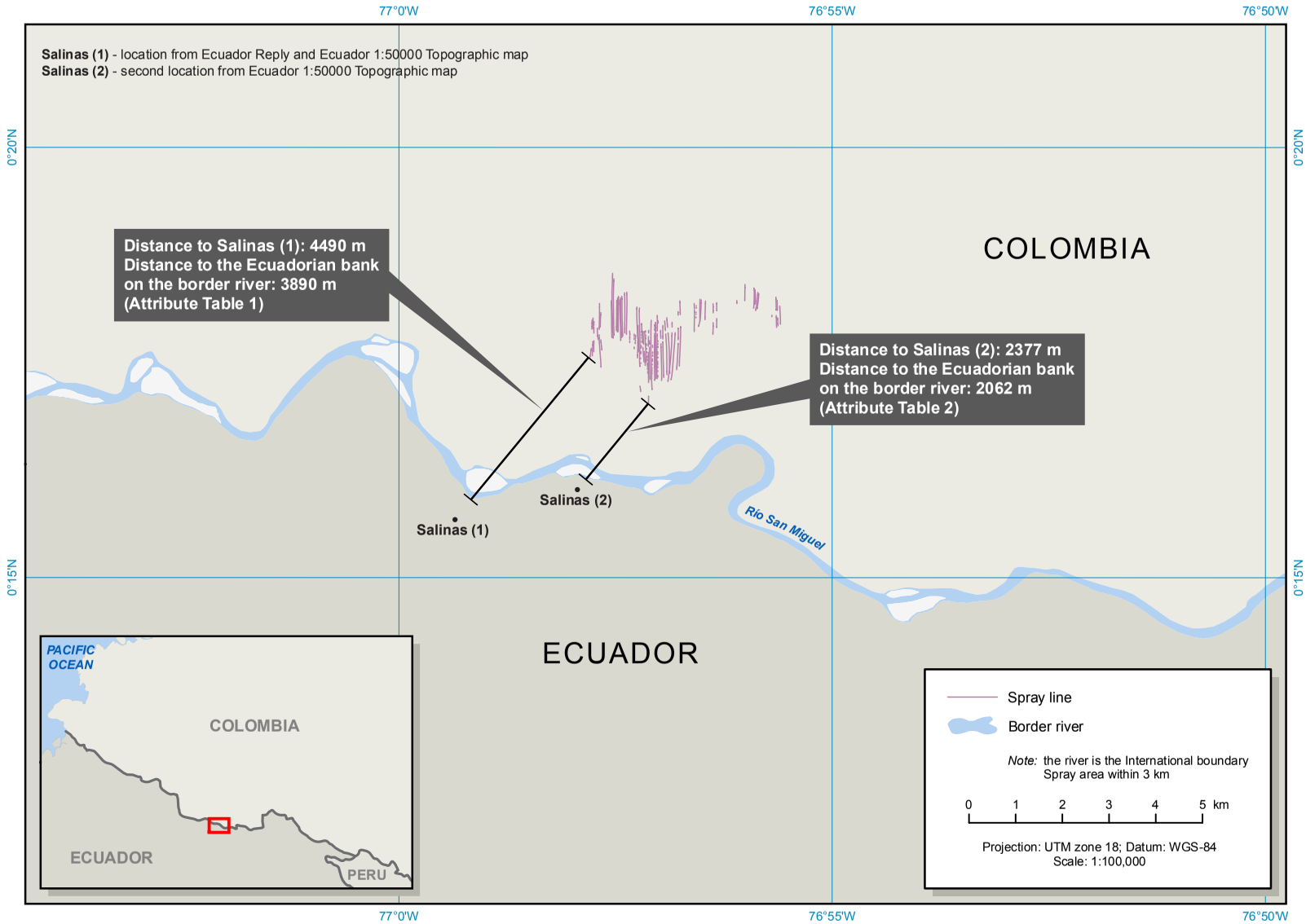


Figure 1. Salinas, Spray Lines in 2000 (Witnesses 1-2-3-6-7)

Salinas, 2000 (witness 3)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 1

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
5422	003293	13:44:19.25	1,200	37,88	185,820	11,700	1	91,270	1,200	10	9	9	100	l310cfcc	201,637	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		13:44	FEET		MILES/HOUR									31 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	299	66

Attribute Table 2

SALINAS 1:
Distance to Salinas location: 4,490 metres, over four kilometres.
Distance to the Ecuadorian bank on the border river: 3,890 metres, nearly four kilometres.

SALINAS 2:
Distance to Salinas location: 2,377 metres, over two kilometres
Distance to the Ecuadorian bank on the border river: 2,062 metres, over two kilometres

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.099 g/ha, respectively.[45] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[46] This shows that no damage could have been caused in Ecuador.

[45] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53.
[46] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

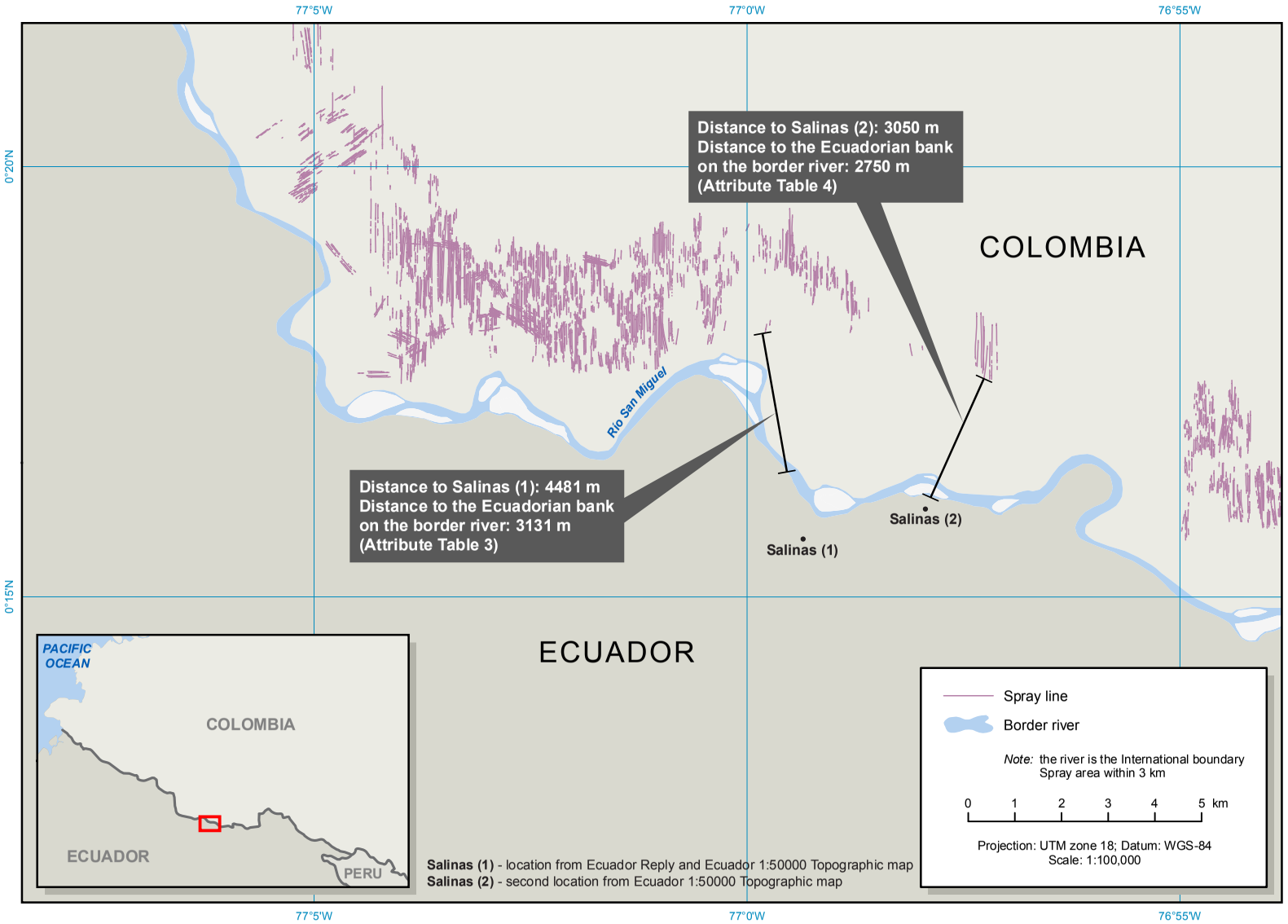


Figure 2. Salinas, Spray Lines in 2001 (Witnesses, 1-2-3-4-5)

Salinas, 2001 (witness 3)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
13644	002771	07:36:22.30	1,200	502,57	165,120	9,600	2	0	1,800	11	11	0	-1	a041j#ac	0	0101	50	Coca	T-65	a041j#ac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		07:36	FEET		MILES/HOUR									04 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	295	70

Attribute Table 3

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
14039	001711	12:18:52.05	1,200	215,84	156,040	11,700	1	0	0,900	11	9	0	-1	a051djdc	0,006	0101	50	Coca	T-65	a051djdc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:18	FEET		MILES/HOUR									05 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	286	79

Attribute Table 4

SALINAS 1:

Distance to Salinas location: 4,481 metres, over four-and-a-half kilometres.
Distance to the Ecuadorian bank on the border river: 3,131 metres, three kilometres

SALINAS 2:

Distance to Salinas location: 3,050 metres, over three kilometres
Distance to the Ecuadorian bank on the border river: 2,750 metres, nearly three kilometres.

Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha, respectively.[47] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[48] This shows that no damage could have been caused in Ecuador.

[47] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44

[48] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

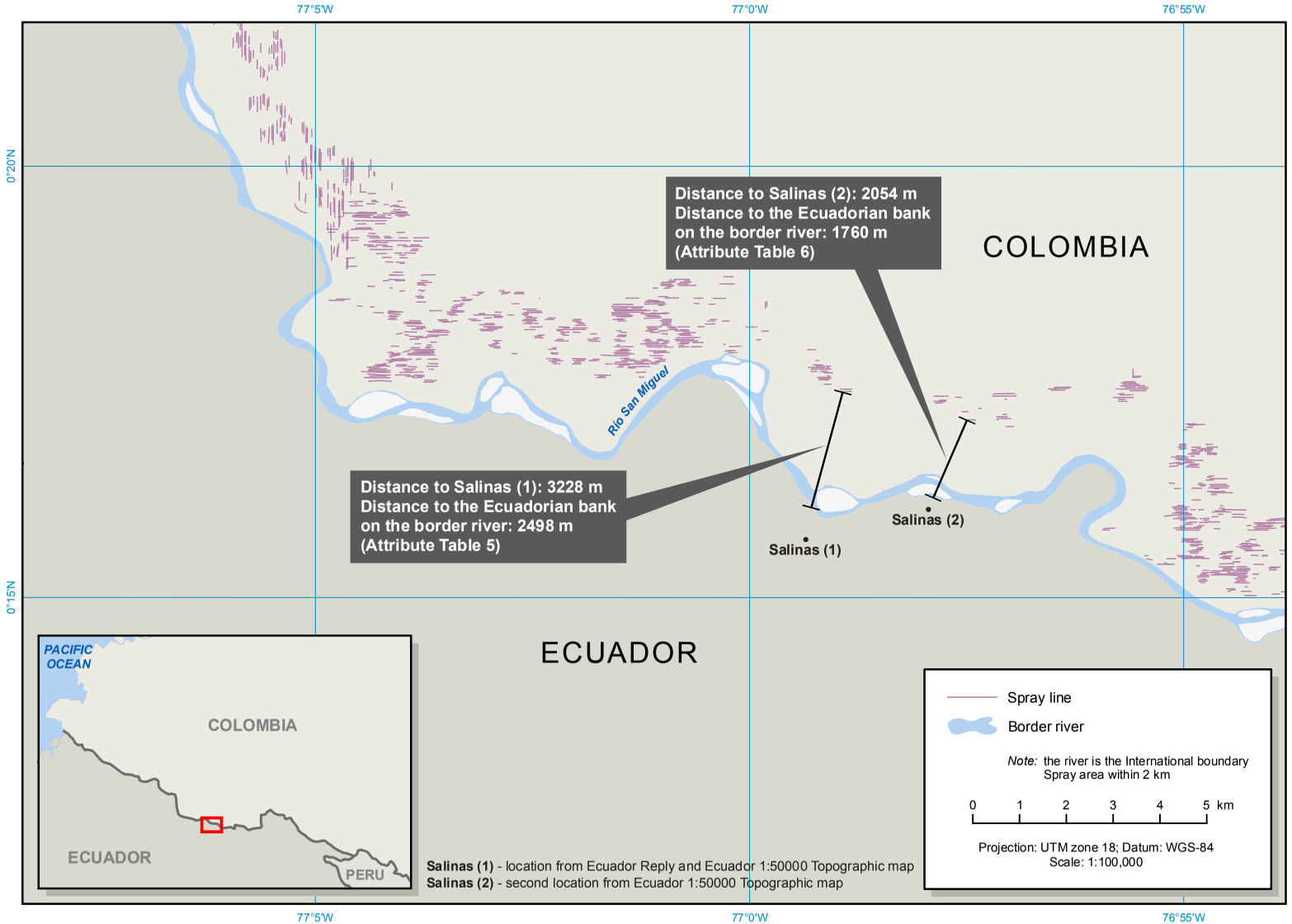


Figure 3. Salinas, Spray Lines in 2002 (Witnesses 2-3)

Salinas, 2002 (witness 3)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2002 (Witnesses 2-3)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
21443	914	I082EZBC.B99	301-2	Right	34	12:15:30:70	0.28979779	-76.98222492	1097	0,770	0,1	25,6	4,700	174,5	0	0	I082EZBC	7,8	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		08 September 2002				12:15			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
333	285	48

Attribute Table 5

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2002 (Witnesses 2-3)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
23513	2994	I082KBCC.B99	301-1	Right	54	18:40:28:07	0.28433029	-76.95826520	1047	0,890	0,2	51,4	10,500	152,400	0	0	I082KBCC	15,951	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		08 September 2002				13:40			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
318	282	36

Attribute Table 6

SALINAS 1:

Distance to Salinas location: 3,228 metres, over three kilometres.
Distance to the Ecuadorian bank on the border river: 2,498 metres, nearly two and a half kilometres.

SALINAS 2:

Distance to Salinas location: 2,054 metres, over two kilometres.
Distance to the Ecuadorian bank on the border river: 1,760 metres, nearly two kilometres.

Hewitt modeled these events and estimated deposition values of 0.11 g/ha and 0.015 g/ha,[49] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[50] This shows that no damage could have been caused in Ecuador.

[49] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 49 and 68.

[50] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 3:

The witness states that he has lived all his life in Salinas, province of Sucumbíos, Ecuador. He does not refer to any specific date but he claims that he was working on his farm, seven or eight years ago, when he saw planes and helicopters flying over the San Miguel River, over his community, which is on the banks of the river. Allegedly the effects appeared fifteen days later.[51]

In a verification effort, Colombia again infers that "seven or eight years ago" means 2000, 2001 or 2002, considering that the statement was rendered on 17 January 2009. Indeed, according to the Spray Data from the Department of State, the spray events closest to Salinas 1 in those years were at 4,500 metres, 4,563 metres and 3,248 metres from the community, respectively; and 3,909, 4,002 and 2,540 metres from the Ecuadorian bank on the border river. For the same years, the closest spray events from Salinas 2 were at distances of 2,392 metres, 3,065 metres, and 2,070 metres from the community, and 2,091, 2,777, and 1,790 metres from the Ecuadorian bank on the border river (see Figures 1, 2 and 3).

All of these events were sprayings on Colombian territory, at distances of between 2 and nearly 4.5 kilometres of the two Salinas locations, and yet the witness claims that he saw the planes and helicopters flying over the San Miguel river and over his community. The falsehood is evident.

The distances of the actual spraying events, and wind trends in the relevant area[52] also evidence the falsity of several of the witness'sclaims. For instance, the witness alleges that "[o]ne could smell a bothersome, intense odor", and he implies that the river got contaminated after the spraying, causing alleged bumps, skin itch, fever diarrhea, vomiting and stomach ache. Furthermore, he states that "[f]ifteen days after the spraying, [he] observed that the crops were turning yellow. Plantain, rice, yucca, and maize. Everything was lost."

Hewitt modeled these events under actual spraying conditions and estimated downwind deposition values of 0.01 g/ha, 0.099 g/ha, 0.106 g/ha, 0.167 g/ha, 0.11 g/ha and 0.015 g/ha, respectively.[53] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[54]

---

[51] EM, Vol. IV, Annex 191.

[52] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[53] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69, 53, 51, 44, 49 and 68, respectively.

[54] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

This shows that no damage could have been caused in Ecuador. This was further confirmed with satellite imagery of the area at the time of the spraying described in the statement. Indeed, very little change in vegetation condition occurred in the Salinas area and the changes identified are attributed to normal agricultural activities.[55]

Apart from the general testimony's falsity, it is also important to note how the witness follows the script prepared for him in a clearly structured fashion:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "A week after the fumigations, we broke out in a rash of bumps on our skin that caused a strong itch."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "My children had fever, diarrhea, vomiting and stomach ache." "My wife suffered from headaches and dizziness."
- Loss of crops, and plants turning yellow. "Fifteen days after the spraying, I observed that the crops were turning yellow. Plantain, rice, yucca, and maize. Everything was lost."
- Effects on soil and subsequent loss of productivity, generally measured in quintals. "The plants no longer produce like before and inside they are yellow."
- Alleged impacts on animals. "The animals were also affected. Three days after the spraying, the chickens that were on the tree at nightfall were found dead, the following day, on the ground. The cows that were pregnant had miscarriages. We also saw a lot of dead fish in the river, during the time of the sprayings. We have even noticed that in recent years there has been a decline in some species such as the monkeys and *guatuzas,* a type of rodent*,* before there were many of them and now there are hardly any."
- He/she had never experienced anything similar before. "Before, despite pests, the land produced, and it produced a lot. After the spraying, everything was lost and the land was left weakened." "It was very strange that everyone in the community got sick at the same time; this had never happened before."
- Final dramatic statements. "My community lives in constant anguish. We do not know when this nightmare will end. We are afraid that they will spray again and we will not be able to feed our children. We do not know how many years it is going to take for the land to produce as it did before".

[55] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

Witness 4

(EM, Vol. IV, Annex 192)

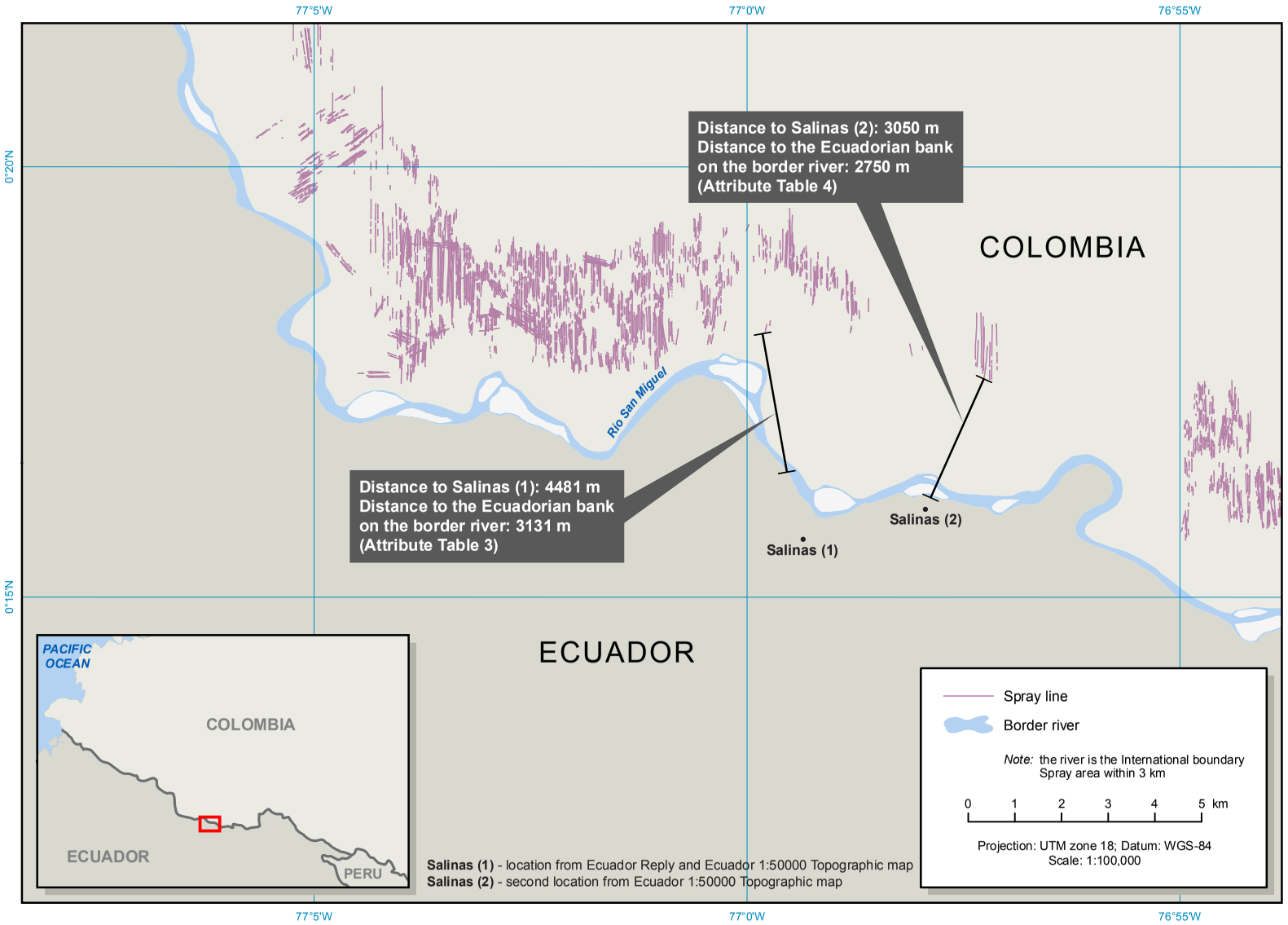


Figure 2. Salinas, Spray Lines in 2001 (Witnesses, 1-2-3-4-5)

Salinas, 2001 (witness 4)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
13644	002771	07:36:22.30	1,200	502,57	165,120	9,600	2	0	1,800	11	11	0	-1	a041j#ac	0	0101	50	Coca	T-65	a041j#ac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		07:36	FEET		MILES/HOUR									04 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	295	70

Attribute Table 3

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
14039	001711	12:18:52.05	1,200	215,84	156,040	11,700	1	0	0,900	11	9	0	-1	a051djdc	0,006	0101	50	Coca	T-65	a051djdc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:18	FEET		MILES/HOUR									05 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	286	79

Attribute Table 4

SALINAS 1:
Distance to Salinas location: 4,481 metres, over four-and-a-half kilometres.
Distance to the Ecuadorian bank on the border river: 3,131 metres, three kilometres

SALINAS 2:
Distance to Salinas location: 3,050 metres, over three kilometres
Distance to the Ecuadorian bank on the border river: 2,750 metres, nearly three kilometres.

Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha, respectively.[56] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[57] This shows that no damage could have been caused in Ecuador.

[56] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.
[57] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 4:

The witness states that she was raised in Salinas, province of Sucumbíos, Ecuador. Even though she still is vague with regard to the approximate date of the sprayings, this time at least she refers to a particular year: in 2001, she remembers having seen two planes followed by helicopters which passed by slowly, several times in the same day, above their community, dropping something like a mist. She was working the farm and she would see the planes crossing the San Miguel River and going from one side of the border to the other. Then she describes the alleged effects.[58]

The data shows that the closest spray line to the river bank on the Ecuadorian side of the border in 2001 was sprayed at distances of between 2.7 and nearly 4.5 kilometres of the two Salinas locations (see Figure 1). It is quite evident that Colombia did not sprayed over Ecuadorian territory, nor directly over the Witness and her children, as she claims.

Witness 4 also claims alleged effects on crops and plants: "On my farm I had planted about twelve hectares of pasture land, plantain, yucca, coffee, and cacao. The spraying completely ruined all of it. A few days after the spraying, the plants started to turn yellow and then they turned black and died." However, general wind trends in the area[59] and the actual spraying distances from the border render drift absolutely irrelevant, and therefore none of the alleged effects could have produced.

Indeed, Hewitt modeled these events and estimated downwind deposition values of 0.106 g/ha and 0.167 g/ha,[60] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[61] This was also confirmed with satellite imagery which shows that very little change in vegetation condition occurred in the Salinas area after the first sprayings, and that the small change is mainly due to normal agricultural activities.[62]

Though the statement's falsity has been shown in its entirety, Colombia will show how the witness follows the common structure prepared for all the witnesses.

---

[58] EM, Vol. IV, Annex 192.

[59] See CR, Vol. I, Chap. 2, Sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[60] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.

[61] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[62] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “Two weeks after the first spraying, my family and I got bumps all over the body, we had an itch that was unbearable.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “My children also suffered from fever and diarrhea, which started a month after the spraying. The following year, they sprayed again and my children had diarrhea all over again, a few weeks after the fumigations.” “Now, we are all sick, many of us suffer from headaches and dizziness.”
- Loss of crops, and plants turning yellow. “On my farm I had planted about twelve hectares of pasture land, plantain, yucca, coffee, and cacao. The spraying completely ruined all of it. A few days after the spraying, the plants started to turn yellow and then they turned black and died.”
- Effects on soil and subsequent loss of productivity, usually measured in quintals. “Two years ago, we planted again, but the soil does not have the same strength as it used to. The plants grew weakly and, when they were cut, inside they were black and dry. Before the fumigations, a hectare of coffee would yield sixty quintals, and a hectare of maize would yield forty quintals. Now, the coffee yields about five quintals per hectare, and the maize about two quintals.”
- Alleged impacts on animals. “A few weeks after the spraying, the calves had a white diarrhea and a few days later they died.” “When I woke up, I found several dead chickens near the tree. The pigs lost their hair and stopped eating. They also died.”
- He/she had never experienced anything similar before. With regard to the alleged effects on plants: “I had never experienced anything like that.” Then she adds: “Never before, not even in the case of a drought or in the rainy season, had the land yielded so little.”
- Final dramatic statements. “If I had a place to go to, I would leave this community. In fact, those who could have done it and that is why there are so many empty houses. But this is my reality and I have no option but to continue fighting every day against something that I did not choose. I cannot give up, I owe it to my children”.

Witness 5

(EM, Vol. IV, Annex 193)

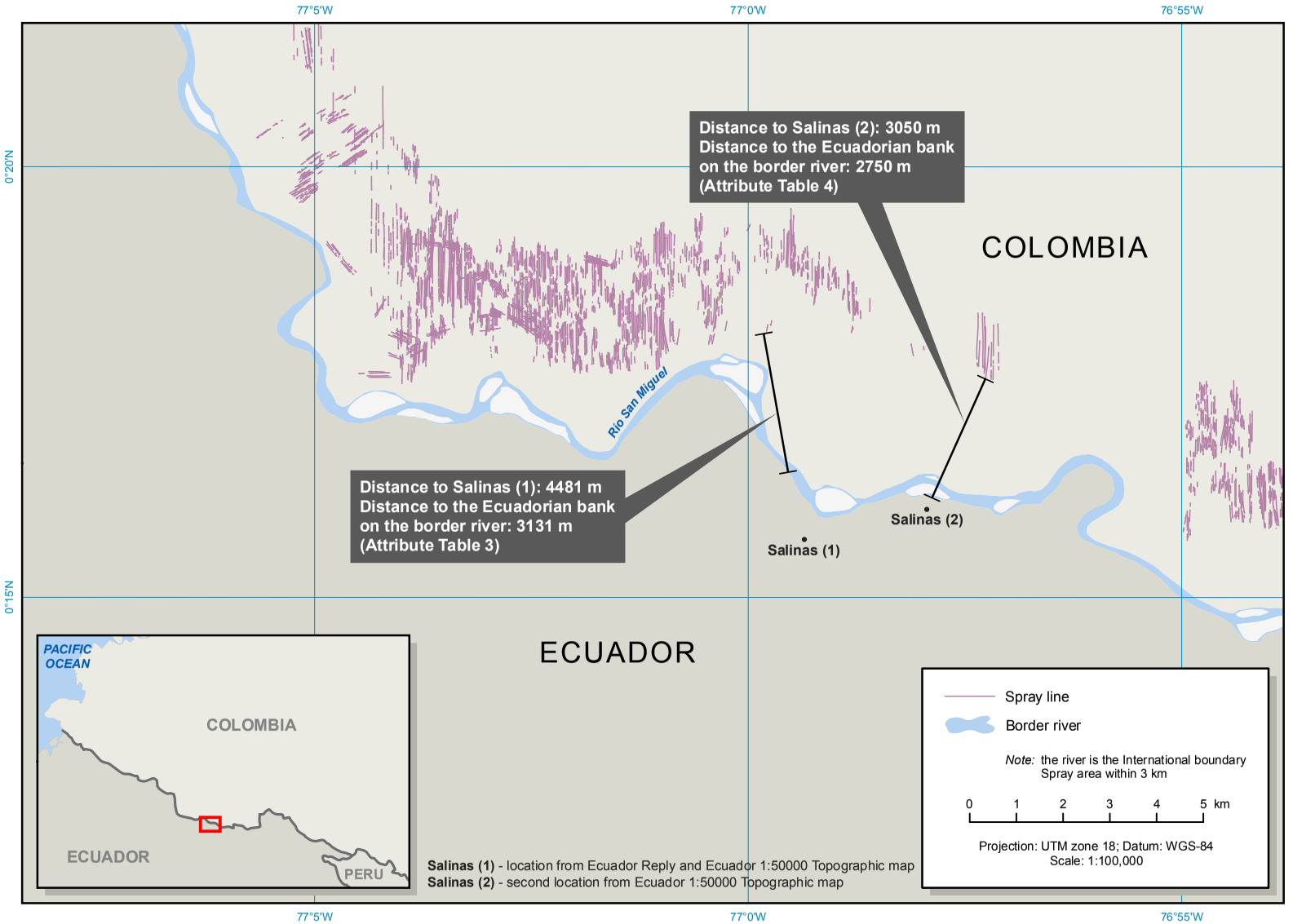


Figure 2. Salinas, Spray Lines in 2001 (Witnesses, 1-2-3-4-5)

Salinas, 2001 (witness 5)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
13644	002771	07:36:22.30	1,200	502,57	165,120	9,600	2	0	1,800	11	11	0	-1	a041j#ac	0	0101	50	Coca	T-65	a041j#ac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		07:36	FEET		MILES/HOUR									04 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	295	70

Attribute Table 3

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2001 (Witnesses 1-2-3-6-7)																					
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
14039	001711	12:18:52.05	1,200	215,84	156,040	11,700	1	0	0,900	11	9	0	-1	a051djdc	0,006	0101	50	Coca	T-65	a051djdc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:18	FEET		MILES/HOUR									05 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	286	79

Attribute Table 4

SALINAS 1:
Distance to Salinas location: 4,481 metres, over four-and-a-half kilometres.
Distance to the Ecuadorian bank on the border river: 3,131 metres, three kilometres

SALINAS 2:
Distance to Salinas location: 3,050 metres, over three kilometres
Distance to the Ecuadorian bank on the border river: 2,750 metres, nearly three kilometres.

Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha, respectively.[63] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[64] This shows that no damage could have been caused in Ecuador.

[63] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44.
[64] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 5:

The witness states that he has lived in Salinas, province of Sucumbíos, for 25 years. He again at least refers to a particular year: "I remember that in 2001 I was working on my farm, which is located near the San Miguel River, and I saw three white planes protected by helicopters flying over Salinas." Allegedly, the effects started immediately.[65]

The data shows that Colombian territory was sprayed in 2001 at distances of between 2.7 and nearly 4.5 kilometres of the two Salinas locations (see Figure 2), and yet the witness cynically claims that he saw the planes […] *flying over Salinas*... The planes did not respect our airspace. They entered our territory *as they were spraying* to turn around toward Colombia. The planes made two or three passes…"[66] The falsehood is evident. Colombia did not spray over Ecuadorian territory as the witness claims.

But the distances involved and the general wind trend in the area[67] also evidence the falsity of other of the witness'sclaims, such as the alleged sour chemical-like odor that could be felt both in the air and in the water, and the usual effects on crops and plants. Indeed, Hewitt modeled these events and estimated deposition values of 0.106 g/ha and 0.167 g/ha,[68] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[69] This was also confirmed with satellite analysis, which concluded that very little change in vegetation condition occurred in the Salinas area after the first sprayings, and that the small change is mainly due to normal agricultural activities.[70]

The witness'sparticularly dramatic statements amid such a false testimony are also remarkable. He goes as far as to state that some children in the community fainted because they had difficulties in breathing and were suffering from dizziness. Moreover, he claims that the sprayings have caused psychological problems in his village, as well as fear, concern, uncertainty and a lot of anxiety.

Anyway, the witness follows in most of the statement the usual script:

---

65 EM, Vol. IV, Annex 193.

66 Emphasis added.

67 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

68 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 51 and 44

69 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

70 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “At that moment, […] my nose started to itch.” “About four days after the fumigations, my body ached all over and my skin itched. I had bumps on my skin that lasted for about a month and a half.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “At that moment, my eyes started to burn.” “The children had headaches and eye irritation. My youngest daughter had vomiting and diarrhea”.
- Loss of crops, and plants turning yellow. “I had planted three hectares of coffee, one of cocoa, and fifteen of pasture. A week after, the coffee began to lose its flowers, the leaves started to turn yellow and then they turned black, drying up completely. The cacao also turned yellow and, when it was cut, one could see inside that the cacao seeds had rotted. The grass turned a yellowish color that began at the top and moved down to the roots.”
- Effects on soil and subsequent loss of productivity measured in quintals. “After the fumigations, I replanted but production began to drop. Out of three hectares, I used to gather sixty quintals of coffee. Now, with a bit of luck, I can barely get fifteen quintals of coffee from the three hectares.” “Unfortunately, the land has remained affected and has low productivity. The plants no longer produce as before.”
- Alleged impacts on animals. “The animals have also suffered. The chickens had shock and died three or four days after the spraying. They went blind and later died. Two cows gave birth ahead of time and their offspring were born deformed.” “It also affected the production of the cows. Usually they had a calf every year, and then after the spraying, they started having calves every three years. I could see a lot of horses in Salinas that had some type of rash and their skin was peeling. After the spraying, small, dead fish could be seen on the riverbank.”
- He/she had never experienced anything similar before. With regard to the planes: “I had never seen anything like it before.” With regard to the alleged health effects: “We have never had an epidemic like the one caused by the sprayings.” With regard to the alleged effects on animals: “This had never happened before.”
- Final dramatic statements. “We live with fear and terror of being sprayed again. We do not want to continue suffering and seeing how innocent children get sick after the sprayings”.

Witness 6

(EM, Vol. IV, Annex 194)

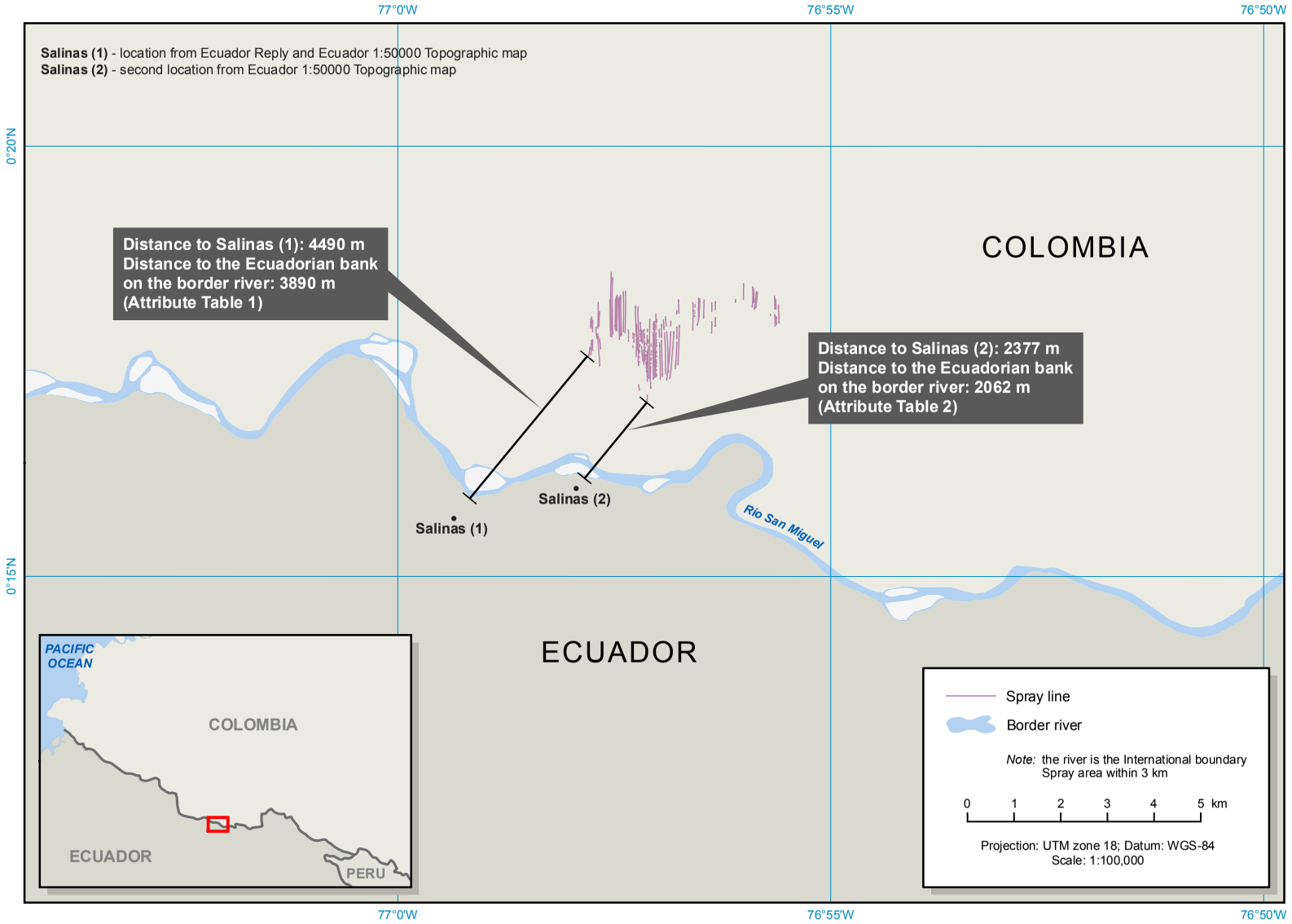


Figure 1. Salinas, Spray Lines in 2000 (Witnesses 1-2-3-6-7)

Salinas, 2000 (witness 6)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 1

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
5422	003293	13:44:19.25	1,200	37,88	185,820	11,700	1	91,270	1,200	10	9	9	100	l310cfcc	201,637	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		13:44	FEET		MILES/HOUR									31 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	299	66

Attribute Table 2

SALINAS 1:
Distance to Salinas location: 4,490 metres, over four kilometres.
Distance to the Ecuadorian bank on the border river: 3,890 metres, nearly four kilometres.

SALINAS 2:
Distance to Salinas location: 2,377 metres, over two kilometres
Distance to the Ecuadorian bank on the border river: 2,062 metres, over two kilometres

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.099 g/ha, respectively.[71] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[72] This shows that no damage could have been caused in Ecuador.

[71] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53.
[72] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 6:

The witness states that she has lived in the Salinas Community, in Sucumbíos, Ecuador, for thirty years. She claims that the first time that she saw the planes spraying by the river, the planes came, flying over the trees. She and her family would watch them from the house near the river. Allegedly, a few days later her family was sick.[73]

As usual the witness does not refer to a particular date or even a specific year, but rather alludes to unspecified events in terms such as "after the sprayings", "[t]he first time I saw the planes spraying", and "[s]hortly after the sprayings". This can be interpreted as intended to refer to 2000, 2001 or 2002. The events shown above in Figure 1, were the first sprayings in the area, in 2000, all of them carried on Colombian territory at distances of between 2 and nearly 4.5 kilometres of the two Salinas locations, and yet the witness claims that the spray crossed the river, getting close to where they were. She also states that her husband saw how "a fine rain fall on the coffee leaves."

At the distances involved, and with the wind blowing generally in the opposite direction,[74] none of the witness's claims could have occurred, not even the alleged effects on plants and crops. Hewitt modeled the closest spraying events and estimated downwind deposition values of 0.01 g/ha and 0.099 g/ha, respectively[75], which would not be enough to harm neither the most sensitive animal species nor plants and crops at all. This has also been confirmed with satellite imagery of the area which clearly shows that very little change in vegetation condition occurred in Salinas after the first sprayings, and that the small change is mainly due to normal agricultural activities.[76]

Still, there is one particularity which cannot go unmentioned. This time the witness dares to imply that the sprayings caused her husband death: "[My husband] never got better; he could not go back to work. He died on the 16 June 2002." This is a particularly serious accusation which will be found also in some witnesses' statements below as a manifestation of the desperate attempt to attain the Court's attention. However, the impossibility for the spray mix to cause human deaths has been acknowledged by Ecuador: "True, its effects on people might not necessarily be fatal…"[77]

---

73 EM, Vol. IV, Annex 194.

74 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

75 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53, respectively.

76 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

77 ER, para. 2.4.

Quite apart from the alleged death, the witness also innovates with regard to a human effect that none of the other witnesses mention. “A few days later, the whole family was sick with a flu that we had never had before.” However, this alleged effect is equally contradicted with the scientific evidence mentioned above.

Anyway, the witness statement contains the usual elements as follows:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “My husband, my children and I had a terrible itch. Each time we scratched, it would bleed.” “The bumps appeared mostly on my husband’s back, his skin peeled, and he bled a lot.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea.
- Loss of crops, and plants turning yellow. “The yucca hardened. The plant turned yellow and it would fall to one side. The fruit was hard. It could not be eaten because it would not get soft even when cooked. We ate plantain, which was also small and hard, but it could be cooked to be eaten. The rice became like straw.”
- Effects on soil and subsequent loss of productivity measured in quintals. “Before the sprayings began on the border, a hectare would produce forty quintals of coffee. With that small amount of coffee, it was enough for us to get by. But, after the sprayings, the plants died or no longer produced even half of what they used to.”
- Alleged impacts on animals. “Shortly after the sprayings, our plants also began to get sick. The coffee […] turned yellow and then it would not produce. We had to cut down an entire hectare of dead coffee.” “With the cacao, the plant did not dry up, but the fruit did and we could not get the seed out. Half of the cacao seeds would come out completely dry and dead and the other half yellow.” “Also, the cows were swollen with blisters on their skin. […] When the swelling was cut, a kind of pus came out, it looked like really bad milk.” “The pregnant cows gave birth and the calves were born healthy, but about eight days later they had white diarrhea, and died. Several chickens died. The other chickens that survived would lay soft eggs with no shell that were not even good enough to eat.” “Almost all of the chicks born during that period died. The pigs had a terrible shaking. They laid there on the ground, and they did not walk or eat.” “The pigs got very thin and finally died.”
- He/she had never experienced anything similar before. “A few days later, the whole family was sick with a flu that we had never had before.” With regard to the alleged effects on cows: “We had never seen this before, which is why we examined their skin.”
- Final dramatic statements. “The diseases suffered by my family, the animals and plants at home and at the homes of the rest of the community, always came back every time we saw the planes spraying along the border. Every time that white smoke came, we became depressed knowing the destruction that awaited us in a short time, and what little we could do to prevent it”.

Witness 7

(EM, Vol. IV, Annex 195)

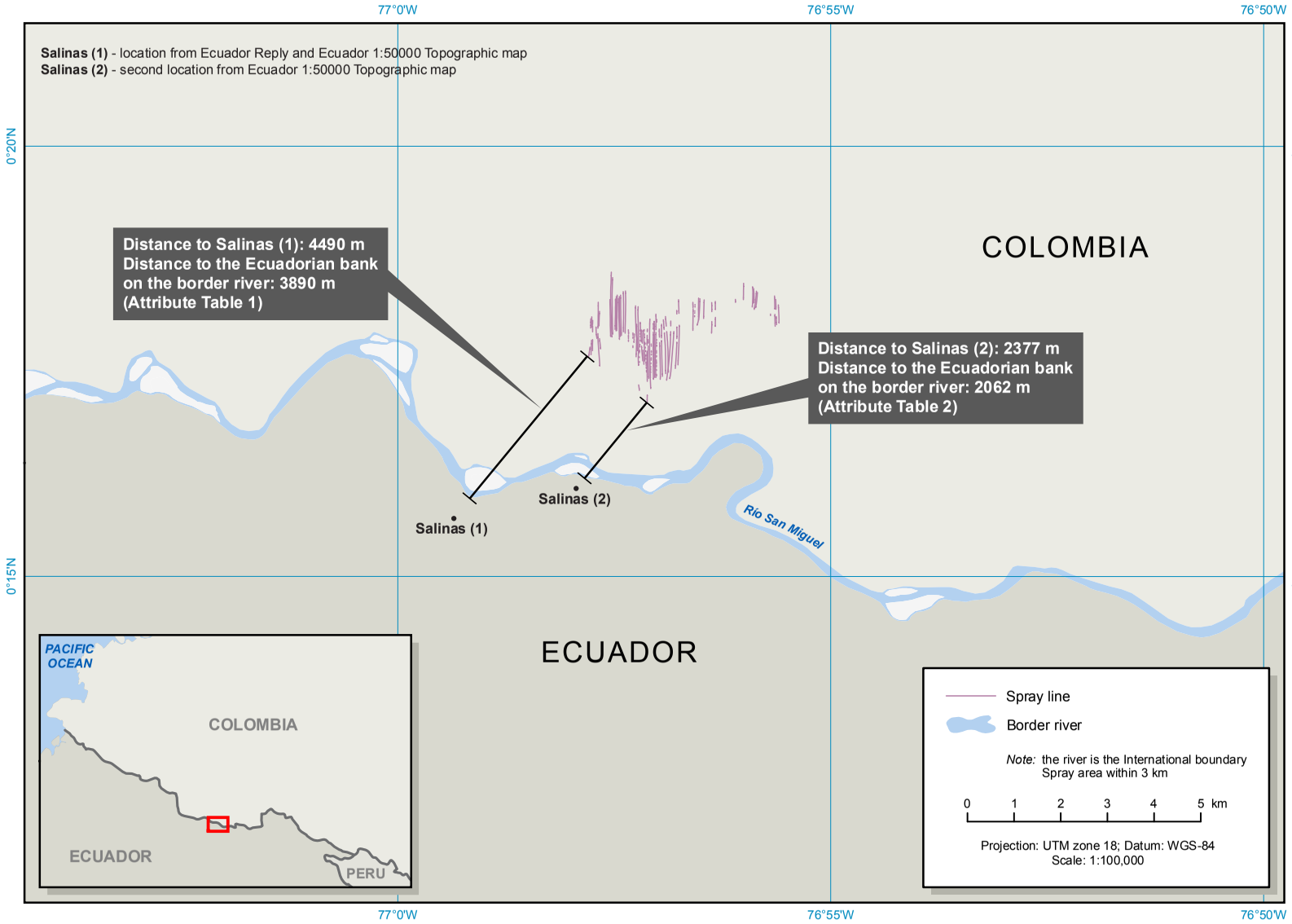


Figure 1. Salinas, Spray Lines in 2000 (Witnesses 1-2-3-6-7)

Salinas, 2000 (witness 7)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (2) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 1

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SALINAS (1) IN 2000 (Witnesses 1-2-3-6-7)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
5422	003293	13:44:19.25	1,200	37,88	185,820	11,700	1	91,270	1,200	10	9	9	100	l310cfcc	201,637	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		13:44	FEET		MILES/HOUR									31 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	299	66

Attribute Table 2

SALINAS 1:

Distance to Salinas location: 4,490 metres, over four kilometres.
Distance to the Ecuadorian bank on the border river: 3,890 metres, nearly four kilometres.

SALINAS 2:

Distance to Salinas location: 2,377 metres, over two kilometres
Distance to the Ecuadorian bank on the border river: 2,062 metres, over two kilometres

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.099 g/ha, respectively.[78] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[79] This shows that no damage could have been caused in Ecuador.

[78] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53.

[79] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 7:

The witness claims that he lives in Salinas, in a farm on the banks of the San Miguel River, from where he has allegedly experienced the sprayings. As for the date, there is no information in the testimony. However, the witness refers to the alleged effects of "[t]he first time that [he] experienced the fumigations".[80]

According to the spray data of the Department of State, the "first time" was in 2000. In that year, as shown in Figure 1, the spray events closest to Salinas 1 and Salinas 2 were at distances of 4,490 metres and 2,377 metres, respectively. Measured from the Ecuadorian bank on the border river the events were at 3,890 and 2,062 metres.

Given the great distance of the Colombian location where the sprayings took place it is not possible to even suggest that the alleged effects were a result of drift. Even in disregard of the general wind trend conditions in the relevant area,[81] Hewitt confirmed this conclusion after modeling these events and estimating deposition values of 0.01 g/ha and 0.099 g/ha, respectively.[82] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[83] This shows that no damage could have been caused in Ecuador.

This is further evidenced with satellite imagery of the area which clearly shows that very little change in vegetation condition occurred in Salinas after the first sprayings, and that the small change is mainly due to normal agricultural activities.[84] Yet the witness alleges that the plants growing by the riverbank would get sick faster than the plants that were farther in. They would turn yellow after a few days, the leaves would fall, until there was nothing left, not even the twig."

The falsehood is already evident, but it does not end there. The statement follows the same pattern, the usual pre-prepared script of the other witnesses:

- Alleged impacts on human health:

---

80 EM, Vol. IV, Annex 195.

81 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

82 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 53, respectively.

83 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

84 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.70- 3.77, pp. 64-73; "[I]t is my opinion that the changes identified in the Salinas study area were merely a result of normal agricultural activities", *Ibid.*, para. 3.77, p. 73.

  - Serious skin irritation/itching and bumps: This witness does not go as far as to claim bleeding bumps as other witnesses do, but he does describe itching and a hot feeling throughout his body. “I started having skin problems, I had itching and felt hot throughout my whole body, as if it were some type of allergy.” “Shortly after the spraying, the itching started, especially in the children.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. The witness does not dare to claim eye burning as others do, but following his script, he says: “[t]he children also got diarrhea, stomachaches, vomiting and a lot of fever.”
- Loss of crops, and plants turning yellow. “The main effect after the spraying was a reduction in the harvest. During that time, I had some pastures that appeared scorched.” “[T]he plants have a lot of problems, because when the fruit is close to ripening, it dries up. We had grape and *zapote* plants on the farm by the riverbank; they were very big, and a week or two following the first spraying they died. One could tell that the plants growing by the riverbank would get sick faster than the plants that were farther in. They would turn yellow after a few days, the leaves would fall, until there was nothing left, not even the twig.”
- Effects on soil and subsequent loss of productivity measured in quintals. “The coffee […] no longer produced the same amounts that we knew it should have. Right before the fumigations, a hectare would yield thirty quintals during harvest time, every fifteen days; now, it yields about three or four quintals per hectare. Today, ten quintals are harvested per hectare; still, it is a very small harvest.”
- Alleged impacts on animals: “About a week after the spraying, one could see an effect – mainly on the calves. Some cows that had been pregnant miscarried or delivered stillborn calves ahead of time. Even though the offspring died, some of the cows did survive. The youngest living calves also died.”
- He/she had never experienced anything similar before: “But after I saw that white smoke, there was this burned appearance, which was very strange and we had never seen it before.” “In the past, we did not have this [itching], it came only after they began spraying.” “This had never happened before to us, the cows dying as they did.”
- Final dramatic statements: “After the sprayings, some families had to abandon their farms, and they still have not returned. Until not long ago, we had always worked on our farms, making money from the land; but, after that smoke fell over us, we have had to find work in anyway we could, because, in any case, we had to provide for our families”.

Witness 8

(EM, Vol. IV, Annex 196)

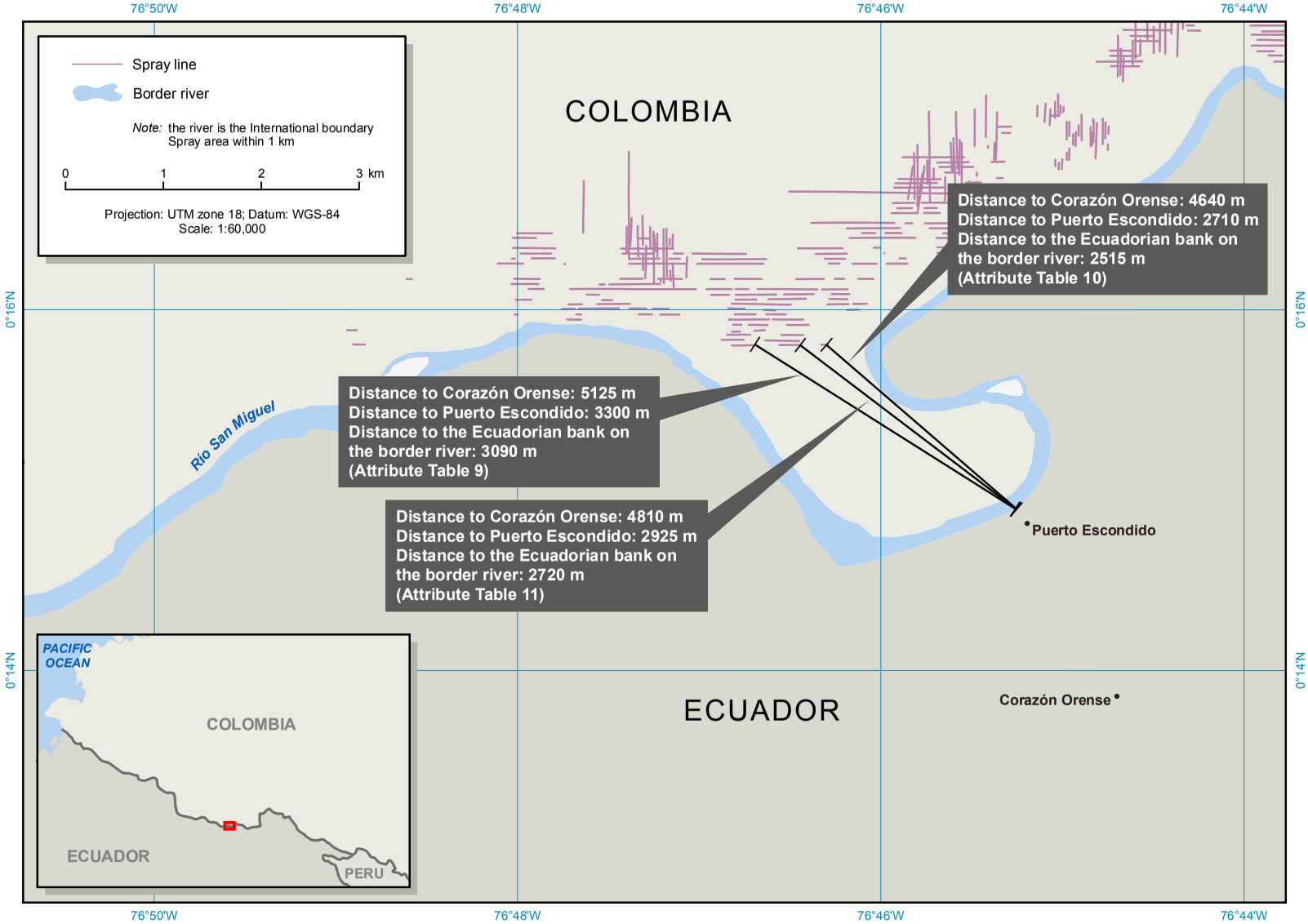


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 8)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[85] This shows that no damage could have been caused in Ecuador.

[85] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50, respectively.

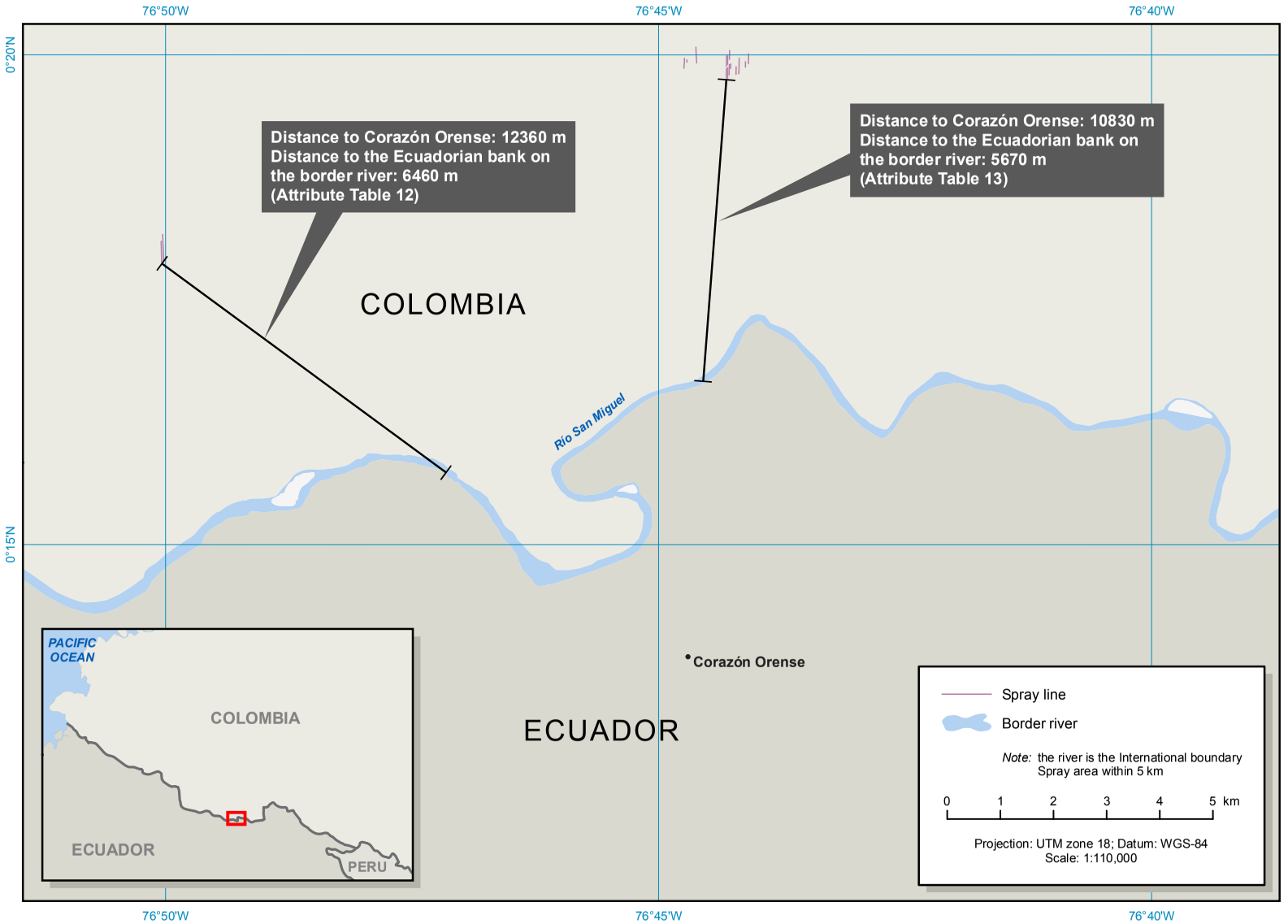


Figure 6. Corazón Orense, Spray Lines in 2003 (Witness 8)

Corazón Orense, 2003 (witness 8)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE IN 2003 (Witness 8)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
12273	694	E233ADAC.B99	289-1	Right	607	13:36:35:47	0.30162120	-76.83405338	1082	0,770	5,4	1316,9	11,700	166,600	2,5	3,023	E233ADAC	402,029	0305	50	T-65	Coca	T-65_Coca
PARAMETERS		23 May 2003				13:36			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
328	288	40

Attribute Table 12

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE IN 2003 (Witness 8)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
2993	286	G093ABBC.B99	290-1	Right	347	11:18:06:50	0.32928509	-76.73853981	1060	0,630	0,2	50,2	5	171,200	0	0,1153	G093ABBC	15,386	0307	50	T-65	Coca	T-65_Coca
PARAMETERS		09 July 2003				11:18			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
322	276	46

Attribute Table 13

CORAZÓN ORENSE:

Distance of the two closest spray lines to Corazón Orense location: 12,360 metres, over twelve kilometres, 10,830 metres, nearly eleven kilometres.

Distance to the Ecuadorian bank on the border river: 6,460 metres, over six kilometres; and 5,670 metres, over five and a half kilometres.

Hewitt modeled these events and estimated deposition values of 0.0395 g/ha and 0.0599 g/ha, respectively.[86] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[87] This shows that no damage could have been caused in Ecuador.

[86] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 64 and 60.

[87] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 8:

The witness states that she has lived in Corazón Orense, province of Sucumbíos, Ecuador, for twenty years. She claims that it was about six or seven years ago when she first saw the planes *spraying over her community*; after a week, allegedly the first effects appeared.[88] As the statement was rendered on 16 January 2009, Colombia infers that she must have been referring to 2002 or 2003. Therefore, both years were analysed.

According to the Spray Data from the Department of State, in those years, the spray events closest to Corazón Orense were at 5,125 metres, 4,810 metres, and 4,640 metres. From the Ecuadorian bank on the border river the same events were at 3,090 metres, 2,720 metres, and 2,515 metres. All of these events were sprayings on Colombian territory, at distances of between 5.5 and 6.5 kilometres from the Ecuadorian bank on the border river, or between nearly 11 and over 12 kilometres from the Corazon Orense location (see Figures 5 and 6). Therefore, the witness could not have seen "the planes spraying over [her] community", as she claims. The falsehood is evident.

Moreover, at the actual spraying distances, any of the alleged effects could not have possibly occurred, not even for plants and crops. Hewitt's modeling of these events resulted in estimated downwind deposition values of 1.2 g/ha, 1.1 g/ha, 0.11 g/ha, 0.0395 g/ha and 0.0599 g/ha, respectively.[89] Even if downwind means towards Ecuador, which is not usually the case,[90] all these values are way below the level of concern even for the most sensitive species[91] and no damage could have been caused in Ecuadorian territory.

For further evidence, Dr Evans extensively analysed satellite imagery of the Puerto Mestanza location, which is north of Corazón Orense and adjacent to the border river. According to his expert opinion, "while changing levels of vegetation may be observed in the Republic of Colombia in 2002-2003 in the immediate area of – and in the weeks immediately following – the September and October 2002 PECIG spraying operations, there are no similar vegetative changes reflected on the Ecuadorian side of the river in the area of the Mestanza farm."

But then, again, the witness follows the same structure prepared for all the witnesses. Her script is the following:

---

88 EM, Vol. IV, Annex 196.

89 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13, 50, 64 and 60.

90 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

91 The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “A week after the spraying, my children and I got bumps that were like blisters and itched a lot. My children also got bumps on their feet that itched a lot and their skin bled”.
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “The children were also stricken with a strong diarrhea and they suffered from vomiting.” “I had a headache, burning eyes and a stomach ache. I still feel burning in my eyes.”
- Loss of crops, and plants turning yellow. “On our farm, we had planted maize, rice, plantain and cacao. After the spraying, everything was damaged. The crops turned yellow and dried up. About two weeks after the spraying, the plants started to wither, it was a slow process that ended with the crops drying up completely.”
- Effects on soil and loss of productivity measured in quintals. “The soil has been made sterile. Before, I used to produce fifty quintals of maize per hectare and now I only produce eight per hectare.”
- Alleged impacts on animals. “One or two days after the sprayings, we saw dead fish in the river, shads and catfish. The pigs were thin and the hogs died. The chickens, of the one hundred that I had, only five were left. One- and two-year old calves also died.”
- He/she had never experienced anything similar before. “[B]efore the sprayings [the children] did not have those bumps.” “Never before in our community have all the children been sick at the same time, with the same symptoms.”
- Final dramatic statements. “Now, the young people have to go to town to work because farming no longer produces.”

Witness 9

(EM, Vol. IV, Annex 197)

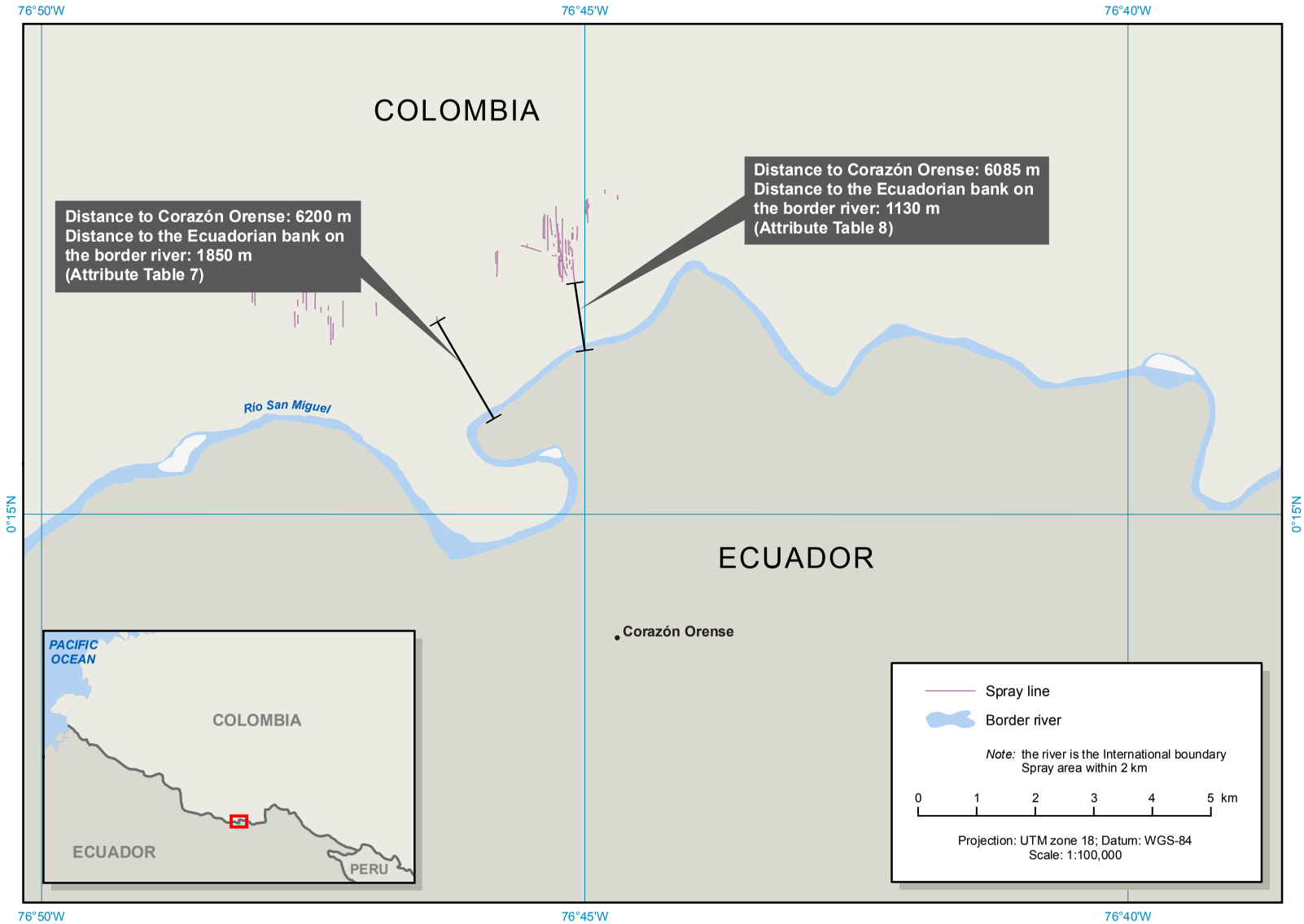


Figure 4. Corazón Orense, Spray Lines in 2001 (Witness 9)

Corazón Orense, 2001 (witness 9)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE IN 2001 (Witness 9)																						
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
18412	002552	09:39:31.82	1,100	-7,49	174,200	2,600	1	75,130	0,800	12	9	10	100	a181cfac	0,001	0101	50	Coca	T-65	a181cfac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		09:39	FEET		MILES/HOUR									18 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	273	62

Attribute Table 7

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE 2001 (Witness 9)																						
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
18508	002647	12:00:17.27	1,100	-785,72	170,980	3,500	1	81,800	1,100	11	9	9	100	a181cfbc	0,004	0101	50	Coca	T-65	a181cfbc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:00	FEET		MILES/HOUR									18 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	272	63

Attribute Table 8

CORAZÓN ORENSE:

Distance of the two closest spray lines to Corazón Orense location: 6,200 metres and 6,085 metres, both over six kilometres.

Distance to the Ecuadorian bank on the border river of both spray lines: 1,850 metres, nearly two kilometres; and 1,130 metres, above one kilometre.

Hewitt modeled these events and estimated deposition values of 0.01 g/ha and 0.2 g/ha, respectively.[92] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[93] This shows that no damage could have been caused in Ecuador.

[92] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 70 and 41.

[93] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

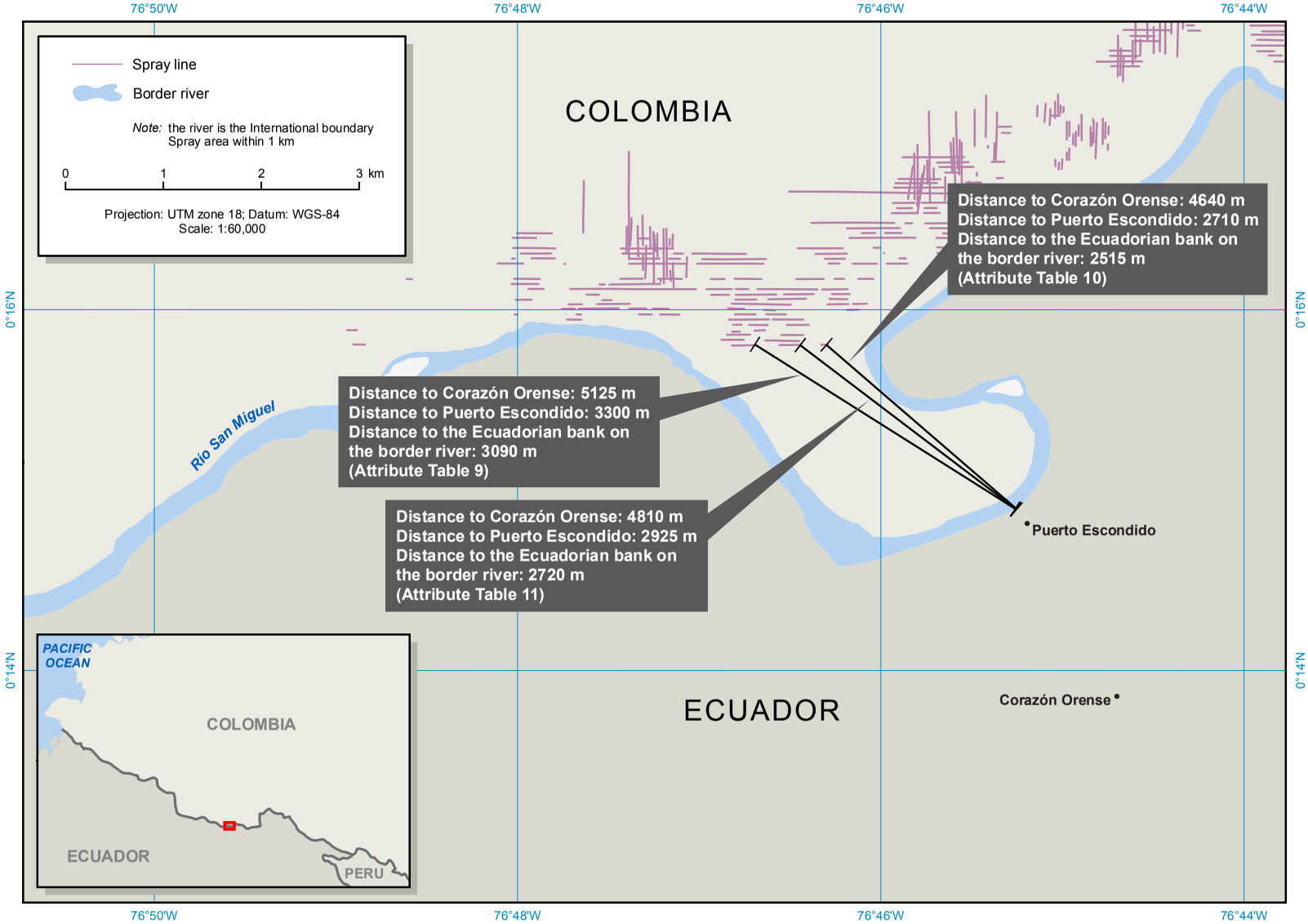


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 9)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[94] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[95] This shows that no damage could have been caused in Ecuador.

[94] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

[95] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 9:

The witness states that she has "lived in Corazon Orense for more than 22 years." "[T]he first spraying that [she] remember[s] occurred about 7 or 8 years ago. The planes came escorted by helicopters and, when [she] saw them, they seemed to be *flying by the edge of the river*, releasing a white smoke that had a strong chemical smell."[96] The witness does not even mention an exact date for this alleged first spraying, but rather alludes to 7 or 8 years ago. As she rendered her testimony on 16 January 2009, Colombia concludes that she must have been referring to 2001 or 2002.

The events shown in Figure 4, from 2001, were the closest sprayings events to the witness's location. All of these events were carried out on Colombian territory, at distances of between 1.1 and nearly 1.8 kilometres from the Ecuadorian bank on the border river, and at distances of over 6 kilometres from Corazón Orense. In 2002, as shown in Figure 6, the closest sprayings were carried out on Colombian territory, at distances of between 2.5 and 3 kilometres from the Ecuadorian bank on the border river, and of between 4.5 and over 5 kilometres from the Corazón Orense location.

Clearly, it is not true that the planes were "flying by the edge of the river" and "spraying again near the community" as the witness states. His claims with regard to the alleged effects on crops –"loss of [his] entire harvest"– are also contradicted by the actual wind conditions in the area;[97] and even ignoring these general wind trends, Hewitt modeled the closest spray events and estimated downwind deposition values of 0.01 g/ha, 0.2 g/ha, 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[98] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[99]

This has been further confirmed by Dr Evans, who analysed satellite imagery of Puerto Mestanza, located north from Corazón Orense and adjacent to the border river. He concluded that while there is a clear evidence of vegetation change in the areas sprayed in Colombia in 2002-2003, there is not a corresponding vegetative change reflected on the Ecuadorian side of the river, not even in a much lesser scale.[100]

---

[96] EM, Vol. IV, Annex 197 [Emphasis added].

[97] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[98] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 70, 41, 10, 13 and 50.

[99] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[100] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.13- 3.38, pp. 14-38; "[M]y expert opinion is that while changing levels of vegetation may be observed in the Republic of Colombia in 2002-2003 in the immediate area of – and in the weeks immediately following – the September and October 2002 PECIG spraying operations, there are no similar changes in

She then follows the usual script:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “Five or six days after the spraying, my children and I got rashes on our arms and legs and then on the rest of our bodies. The rash caused intense itching.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “My children, who were playing outside when the planes came, suffered from burning in their eyes on the day of the spraying.” “I had a strong headache and dizziness. The children also suffered from vomiting and diarrhea, which lasted for two weeks.”
- Loss of crops, and plants turning yellow. “Approximately 15 days after the sprayings, the crops started to turn yellow.” “I lost my entire harvest.” “[t]he soil is damaged and it no longer produces as before the sprayings”.
- Effects on soil and loss of productivity measured in quintals. This time, the witness does not mention quintals, as usual, but he says that “[u]nfortunately, the plants did not grow like before. The land remained affected.”
- Alleged impacts on animals. “The animals also became sick: I had forty chicks and nearly all of them died. The dogs got thin and many pigs lost their hair. The cows that were about to give birth miscarried.”
- He/she had never experienced anything similar before. “I lost my entire harvest. Nothing like this has ever happened before.”
- Final dramatic statements. “All of this that we have had to endure has been very hard on us. We have sacrificed ourselves for many years working this land. Unfortunately, I do not have any choice but to stay here with my family. No one wants to buy my land because the soil is damaged and it no longer produces as before the sprayings”.

vegetation reflected on the Ecuadorian side of the river in the area of the Mestanza farm.” *Ibid.*, para. 3.38, p. 36.

Witness 10

(EM, Vol. IV, Annex 198)

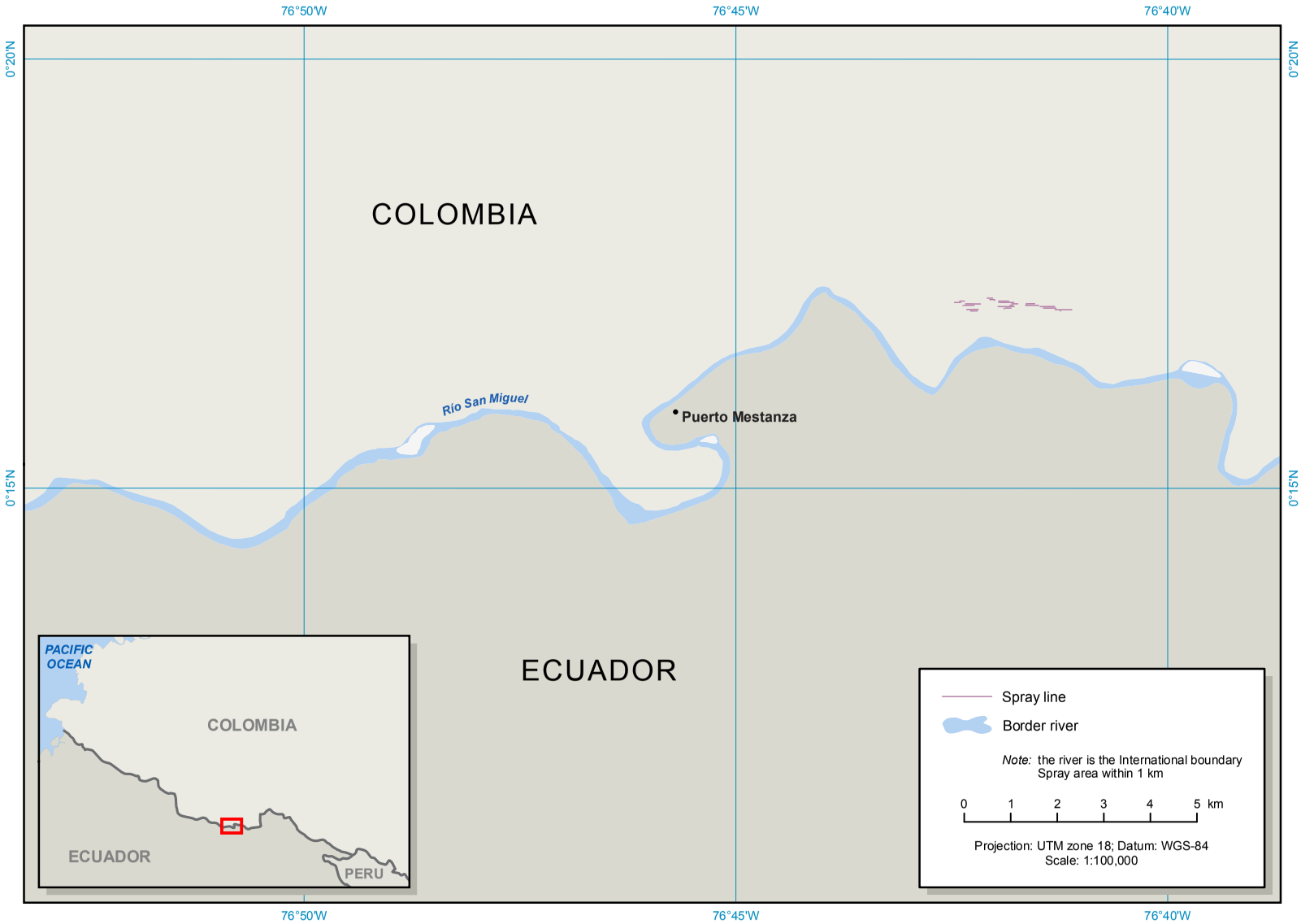


Figure 24. Puerto Mestanza, Spray Lines in 2004 (Witness 10)

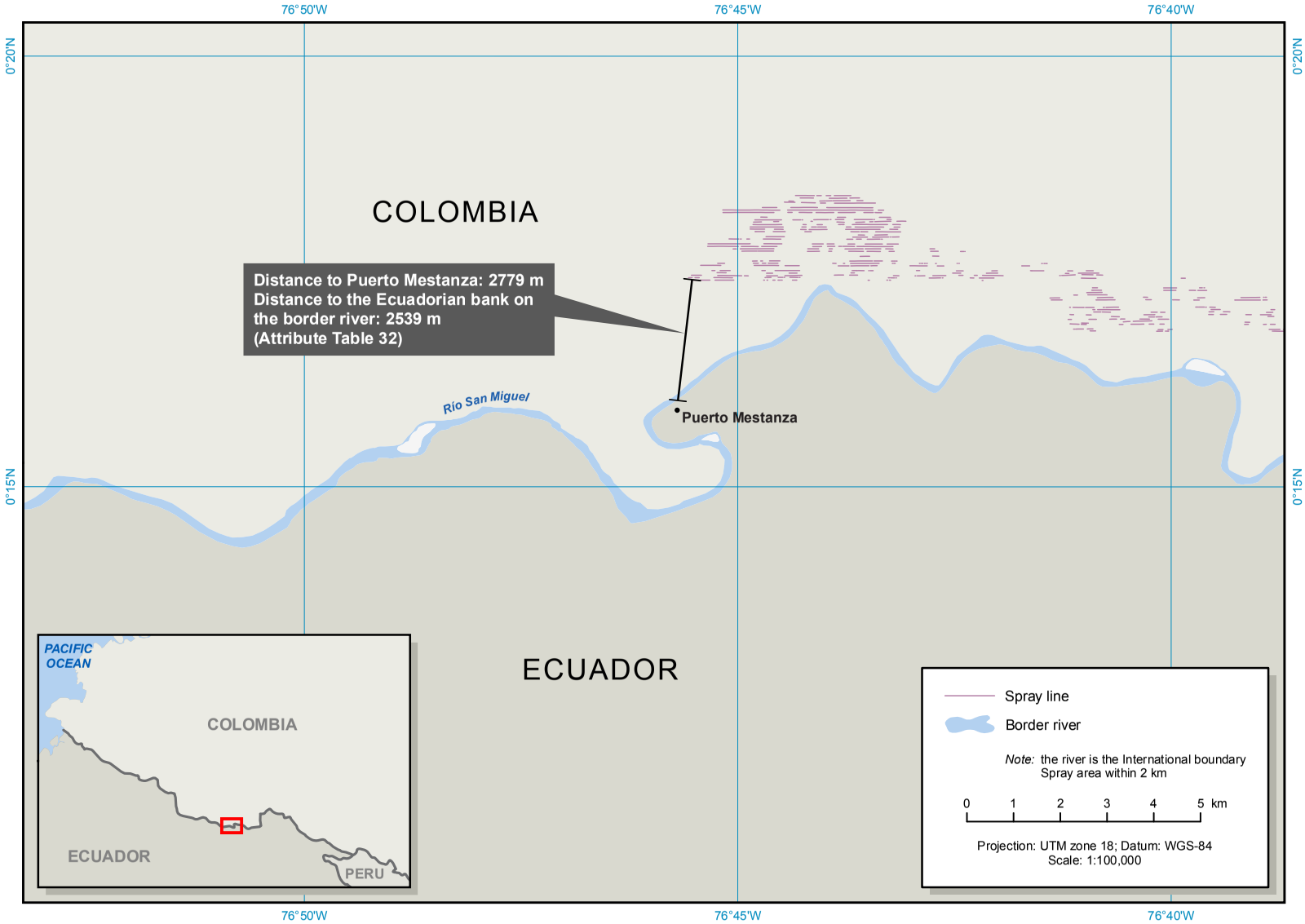


Figure 25. Puerto Mestanza, Spray Lines in 2005 (Witness 10)

Puerto Mestanza, 2005 (Witness 10)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA PUERTO MESTANZA 2005 (Witness 10)																					
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP
3295	1238	J135VMAC.B99	303-1	Right	22	8:43:14:20	0.28998635	-76.75882764	322	0,890	1,2	109,7	0,800	204,500	6,300	0,568	109,577	0510	85	OV-10	OV-10_Coca
PARAMETERS		13 OCTOBER 2005				08:43			METRES					MILES/HOUR							

ADDED ATTRIBUTES	
Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
276	46

Attribute Table 32

PUERTO MESTANZA, 2005:

Distance of the closest spray line to the location of Puerto Mestanza: 2,779 metres, nearly three kilometres.

Distance to the Ecuadorian bank of the border river: 2,539 metres, over two and a half kilometres.

Hewitt modeled this event and estimated deposition value of 0.36 g/ha.[101] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[102] This shows that no damage could have been caused in Ecuador.

[101] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 33.

[102] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 10:

The witness states that he has lived in Puerto Mestanza for the past ten years. With regard to dates, the witness claims that he clearly remembers "a spraying approximately four years ago that extremely affected the cattle".[103] Four years prior to the witness's testimony would have been 2004 or 2005.

According to the Spray Data from the Department of State, there were no spray events in the relevant area during 2004 (see Figure 24). For 2005, the event shown in Figure 25 was a spraying on Colombian territory, which was the closest spray line to the location of Puerto Mestanza at a distance of 2,779 metres, i.e., nearly three kilometres, and at 2,539 metres from the Ecuadorian bank of the border river, i.e., over 2.5 kilometres.

Yet the witness makes the following preposterous allegations: "Shortly after the planes came, the cattle died. I have several neighbours whose cows were pregnant and had miscarriages. This had never happened before. They ate the affected pasture and drank the water contaminated with the chemicals that the planes dropped. All the rice, maize, *malanga* and also the cacao were ruined. Even the pastures dried up to a yellow color." Such effects on cattle do not occur even under direct overspray, and those, as well as the alleged effects on vegetation, could not have occurred under the general wind trends and at the distances involved.[104]

Hewitt confirmed this conclusion after modeling these events and estimating a downwind deposition value of 0.36 g/ha.[105] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[106] And this was further evidenced by Evans' analysis of satellite imagery, which allowed him to conclude that "while changing levels of vegetation may be observed in the Republic of Colombia in 2002-2003 in the immediate area of –and in the weeks immediately following– the September and October 2002 PECIG spraying operations, there are no similar vegetative changes reflected on the Ecuadorian side of the river in the area of the Mestanza farm."[107]

---

[103] EM, Vol. IV, Annex 198.

[104] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[105] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 33.

[106] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

[107] CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, para. 3.38, pp. 38.

The falsehood is evident but, again, it does not end there. Even though this time the witness does not describe any alleged impacts on human health, he does follow the usual structure with regard to the other elements:

- Loss of crops, and plants turning yellow. “All the rice, maize, *malanga*, and also the cacao were ruined. Even the pastures dried up to a yellow color.”
- Effects on soil and loss of productivity measured in quintals. “Here, in Ecuador, after the sprayings, the soil has lost its strength. Now, the soil has to be fertilized a lot. After the first fumigations, the effects on the soil were very strong, stronger than other times when the crops also died. After that first time, nothing could be planted in the soil. The other times when there were fumigations, it was possible to replant the plants after they died, but it was very hard to make them grow and produce.”
- Alleged impacts on animals. “Shortly after the planes came, the cattle died. I have several neighbors whose cows were pregnant and had miscarriages.” “They ate the affected pasture and drank the water contaminated with the chemicals that the planes dropped.” “I went to the river to fish the day after the sprayings and I saw dead catfish, *bocachico* and black pacu in the streams that run from the San Miguel River.” “A while ago, one could throw a net and catch fish. I would leave the fishing lines and return the following day; then, one fished a lot. After the sprayings, fishing has been tough and sometimes I spend half a day or a whole day just to catch one fish.”
- He/she had never experienced anything similar before. “The fish looked inflated on the water. I had never seen this before the sprayings.” “I have several neighbors whose cows were pregnant and had miscarriages. This had never happened before.”
- Final dramatic statements. “A *campesino* is a *campesino* for life, there is no other life for me but to hope they do not spray again”.

Witness 11

(EM, Vol. IV, Annex 199)

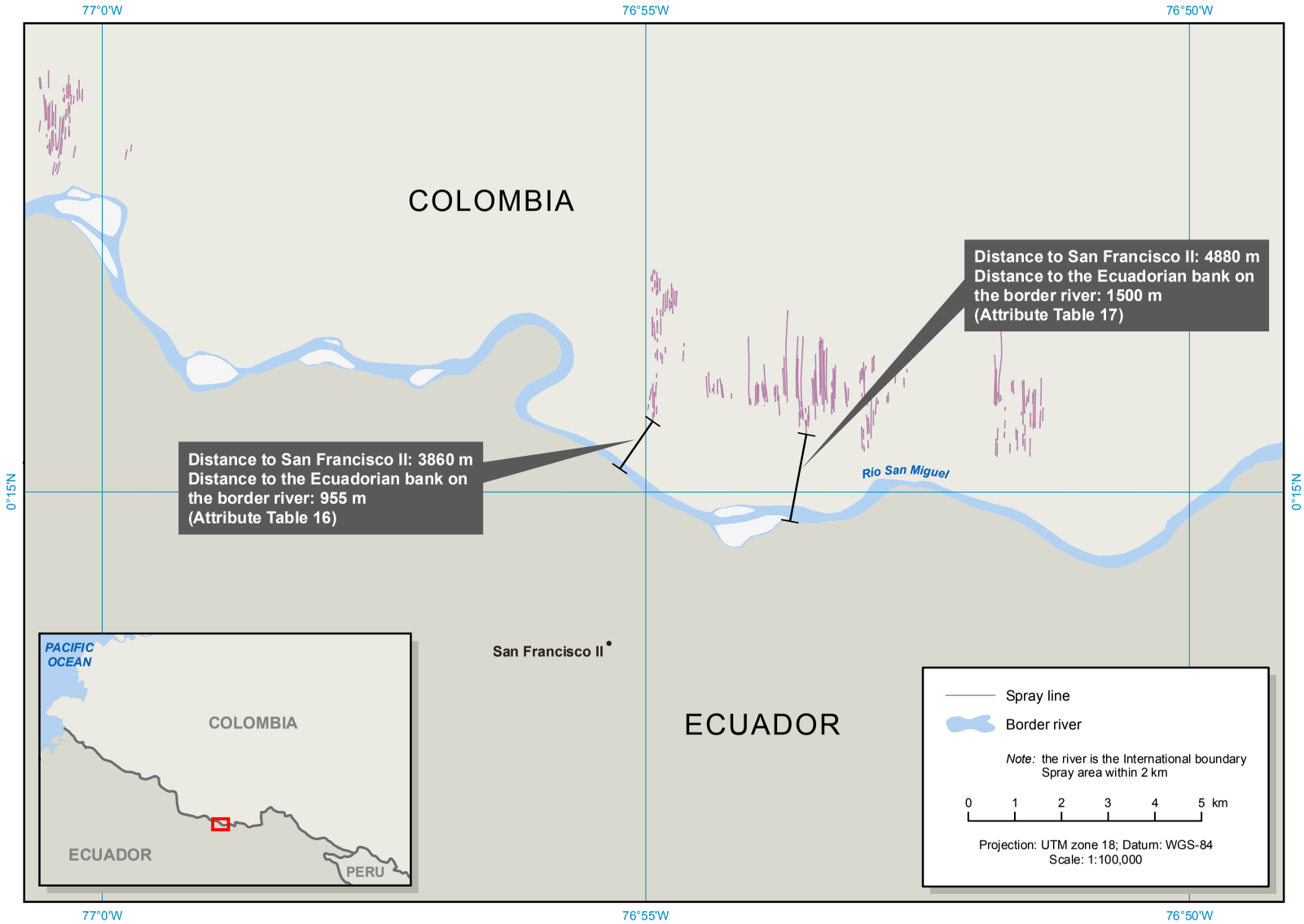


Figure 8. San Francisco II, Spray Lines in 2001 (Witness 11)

San Francisco II, 2001 (Witness 11)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2001 (Witness 11)																					
FID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
8959	003527	13:24:17.48	1,000	-9,94	186,270	1,800	1	10,660	1,100	8	8	0	-1	a271kbac	0,001	0101	50	Coca	T-65	a271kbac	2001_sl_lines.sh	T-65_Coca
PARAMETERS		13:24	FEET		MILES/HOUR									27 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
304	274	30

Attribute Table 16

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2001 (Witness 11)																					
FID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	TYPE	AIRCRAFT	LOG	SOURCETHM	AC_CROP
8254	001979	12:52:41.20	1,200	137,11	163,280	1,730	2	0,000	1,700	10	10	0	-1	a241jddc	0,002	0101	50	Coca	T-65	a241jddc	2001_sl_lines.sh	T-65_Coca
PARAMETERS		12:52	FEET		MILES/HOUR									24 January 2001								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
365	287	78

Attribute Table 17

SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco II location: 3860 metres and 4880 metres.

Distance to the Ecuadorian bank on the border river: 955 metres, and 1500 metres.

Hewitt modeled these events and estimated deposition values of 0.033 g/ha and 0.1 g/ha, respectively.[108] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[109] This shows that no damage could have been caused in Ecuador.

[108] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 67 and 52.

[109] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

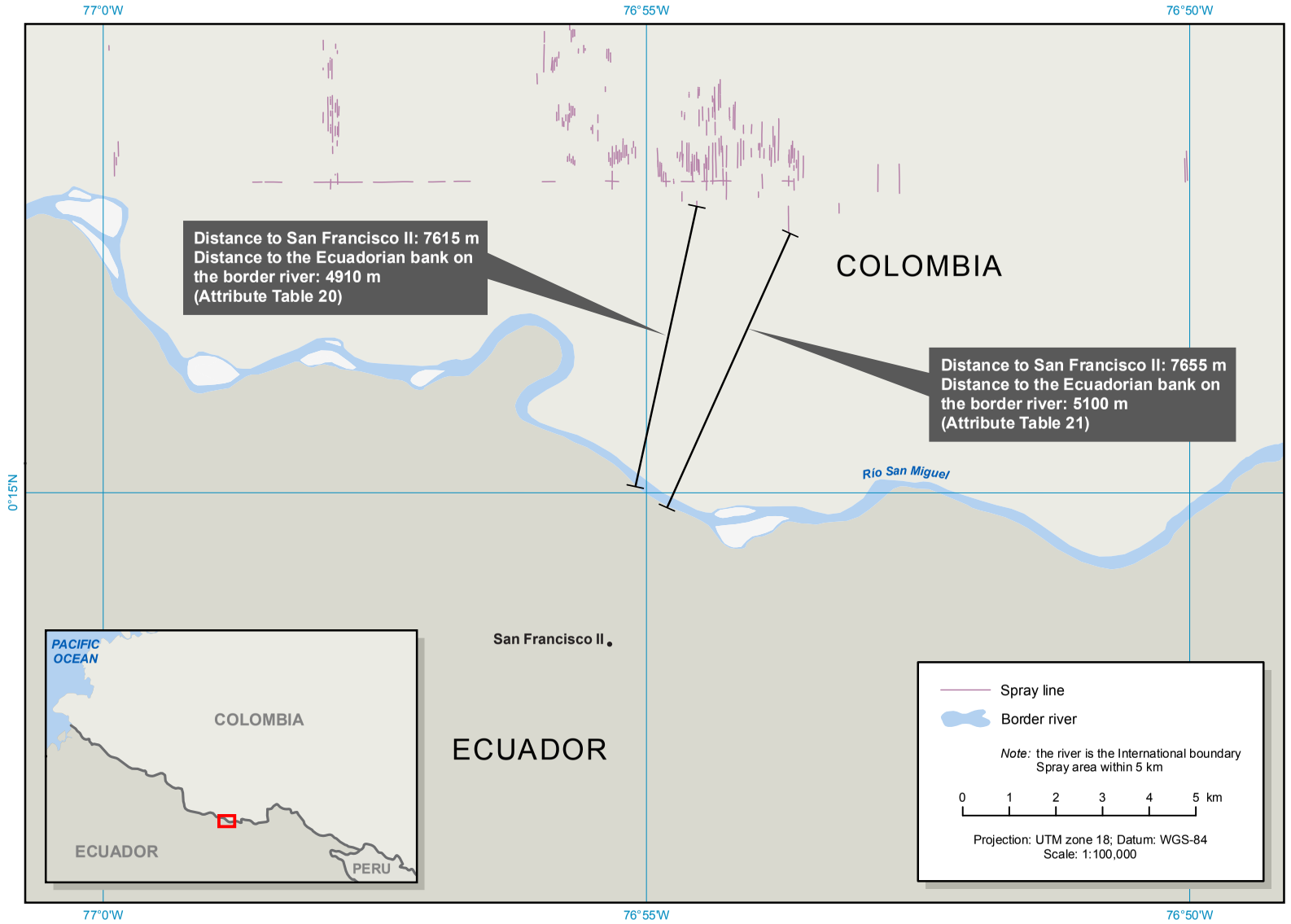


Figure 10. San Francisco II, Spray Lines in 2003 (Witnesses 11-17)

San Francisco II, 2003 (Witness 11)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2003 (Witness 11)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
2701	730	G103JJDC.B99	289-1	Right	333	14:04:35:80	0.29445543	-76.90890373	1173	0,770	0,1	26,1	33	178,300	2,5	0,060	G103JJDC	7,959	0307	50	T-65	Coca	T-65_Coca
PARAMETERS		10 July 2003				14:04			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
356	293	63

Attribute Table 20

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2003 (Witness 11)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1412	291	G143CJAC.B99	289-1	Right	385	10:02:15:30	0.29426431	-76.89484179	1135	0,770	6,1	1504,2	27,500	168,100	2,500	3,453	G143CJAC	458,599	0307	50	T-65	Coca	T-65_Coca
PARAMETERS		14 July 2003				10:02			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
345	296	49

Attribute Table 21

SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco II location: 7,615 metres and 7,655 metres.

Distance to the Ecuadorian bank on the border river: 4,910 metres and 5,100 metres.

Hewitt modeled these events and estimated deposition values of 0.076 g/ha and 0.0645 g/ha, respectively.[110] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[111] This shows that no damage could have been caused in Ecuador.

[110] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 56 and 59.

[111] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 11:

The witness states that she has lived in San Francisco II all her life. She claims that at the beginning of the year 2001, she remembers that some planes came by spraying, and that she was working on a farm near the San Miguel River. Two years later, she claims to have experienced another period of spraying.[112]

According to the Spray Data from the Department of State, in 2001 (Figure 8) the closest spray lines to San Francisco II were conducted on Colombian territory at distances of between nearly 1 kilometre and 1.5 kilometres from the Ecuadorian bank on the border river; yet the witness claims that "the planes came by spraying" and "[t]he planes were above [her]" and the "liquid" fell on her baby, who "stopped drinking [her] breast milk and died on twenty-five September, two thousand and one." The falsehood is evident.

The events of 2003 (Figure 10), "two years later", were sprayings on Colombian territory at distances of over 7.5 kilometres from the San Francisco II location, and of around 5 kilometres from the Ecuadorian bank on the border river. Yet, the witness goes as far as claiming that her second infant daughter also died as a result of that spraying: "Two years later, during a period of spraying, my two-month-old daughter died." "[S]he died on ten September, two thousand and three."

The sole accusation of two babies dying as a consequence of the spraying is absolutely outrageous. However, its falsity is evident not only from the fact that the sprayings were carried out too far from the witness's location. As stated above, the Ecuadorian *Reply* also acknowledged the scientific conclusion on the impossibility of lethal effects of the mixture: "True, its effects on people might not necessarily be fatal…"[113]

Anyway, this particularly serious falsity in which the witness incurs, acknowledged by Ecuador, not only should be more than enough to discredit the whole statement. It is also telling on how far Ecuador can go in its desperate attempt to unfoundedly demonstrate a link between the sprayings and some alleged effects, and therefore the general scepticism with which the Court should proceed with regard to all of what the witnesses allege.

As shown, in both years the spray events were too far to cause any of the supposed effects. Even ignoring the general wind trends in the area,[114] Hewitt confirmed this conclusion by estimating deposition values of 0.033 g/ha, 0.1 g/ha, 0.076 g/ha and 0.0645 g/ha for the

---

112 EM, Vol. IV, Annex 199.

113 ER, para. 2.4.

114 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

closest spray events in both years.[115] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[116] This shows that no damage could have been caused in Ecuador.

Nevertheless, in the interest of completeness, Colombia will show how the witness again follows the same structure as the rest of the witnesses, confirming that it is part of a pre-prepared script:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "The rest of us in the family had a rash. They were little bubbles that would burst."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "But after the sprayings, [my baby] became sick with the same thing that my other daughter had, […] vomiting, diarrhea and fever."
- Loss of crops, and plants turning yellow. "Also, shortly after the smoke of the planes visited us for the first time, and every time after that, all the plants dried up. We had planted maize, rice, cocoa, and plantain on our farm."
- Effects on soil and loss of productivity measured in quintals. "The plants are growing but not very well. The yucca still has problems; it comes out of the skin rotted with black spots."
- He/she had never experienced anything similar before. "She was born fat and pretty, and before the sprayings she never had any problems."
- Final dramatic statements. "Some Kichwa families have abandoned their homes for fear of problems from the sprayings. I, too, thought of leaving the border but I stayed because my whole family is here".

[115] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 67, 52, 56 and 59.

[116] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 12

(EM, Vol. IV, Annex 200)

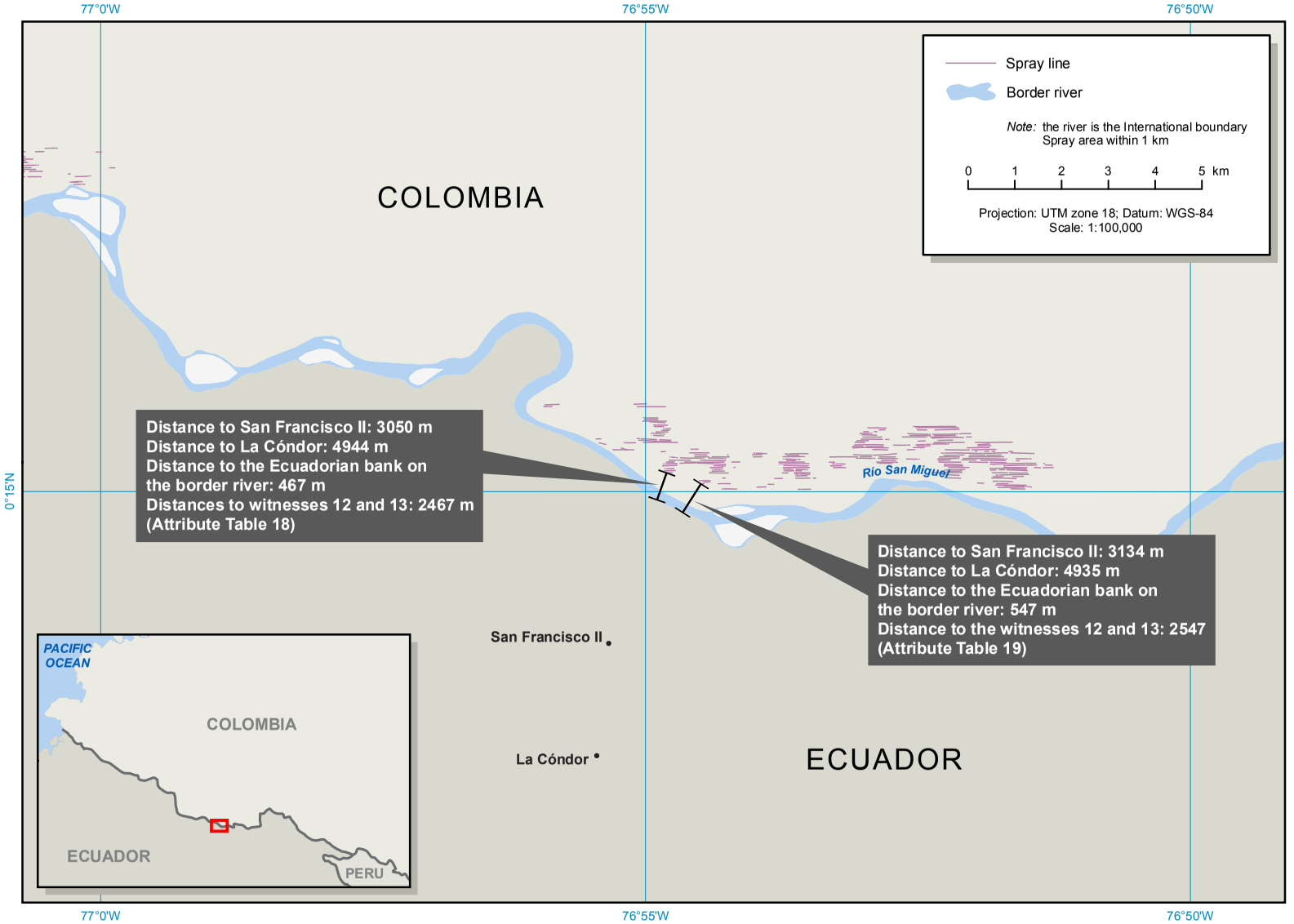


Figure 9. San Francisco II and La Cóndor, Spray Lines in 2002 (Witnesses 12-13-17)

San Francisco II and La Condor, 2002 (Witness 12)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15724	528	I222A#DC.B99	301-1	Right	168	10:59:30:80	0.25294071	-76.91334732	1068	0,890	0,1	20	19,900	136,100	0	0	I222A#CC	6,077	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		22 September 2002				10:59			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
324	279	45

Attribute Table 18

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15758	562	I222A#DC.B99	301-1	Right	174	11:05:10:20	0.25123216	-76.90809108	1062	0,770	0,1	21	0,100	143,300	0	0	I222A#CC	6,399	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		22 September 2002				11:05			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
322	279	43

Attribute Table 19

SAN FRANCISCO II AND LA CÓNDOR:

Distance of the two closest spray lines to San Francisco II location: 3,050 metres and 3,134 metres, over three kilometres.

Distance of the two closest spray lines to La Cóndor location: 4,944 metres and 4,935 metres, nearly five kilometres.

Distance to the Ecuadorian bank on the border river: 467 metres and 547 metres.

Distance of the two closest spray lines to witnesses 12 and 13 locations: 2,467 metres and 2,547 metres, nearly two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 0.75 g/ha and 0.41 g/ha, respectively.[117] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[118] This shows that no damage could have been caused in Ecuador.

[117] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16 and 30.

[118] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 12:

The witness states that she has "lived in San Francisco 2, province of Sucumbíos, *about two kilometers from the border*, for thirty years." "I have five children and I work as a farmer on my thirty-five hectare farm. In the year two thousand and two, I was working on the farm and I saw planes in the air, accompanied by one helicopter. One could clearly see that they were releasing a white smoke similar to the rain that fell on me." The effects allegedly started immediately.[119]

According to the Spray Data from the Department of State and as shown in Figure 9, in 2002 the two closest spray lines to San Francisco II were at a distance of nearly 2.5 kilometres from the witness's reported location (lived... about two kilometres from the border"). Yet, the witness claims that she "*could clearly see* that they were releasing a white smoke similar to the rain *that fell on me*." "It had a very strong odor; and immediately my eyes started watering and I remember they burned a lot. I was never able to recover my sight." [120] The falsehood is evident.

But she also states that around 2004 "they sprayed again, although a little farther away." To be sure, it would have been more than "a little farther away", since the spray event closest to San Francisco II in 2004 was at 11.8 kilometres.

Even ignoring the general wind trends in the area**,**[121] there could have been only minimal deposition resulting from these events at the distances involved, and drift could not have resulted in any of the damages complained of by Ecuador, not even for plants and crops. Hewitt confirmed this conclusion after modeling the closest spray events in 2002 and estimating deposition values of 0.75 g/ha and 0.41 g/ha.[122] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[123]

This was further evidenced by Evans, who conducted an analysis to identify and quantify vegetation changes that occurred within the area from September 12 to October 14, 2002, using satellite images. He concluded that no significant change in vegetation condition is

---

119 EM, Vol. IV, Annex 200 [Emphasis added].

120 *Ibid.* [Emphasis added].

121 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

122 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16 and 30.

123 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[124]

Yet, as the previous witness –who claimed that two of her daughters died after the spraying– Witness 12 also claims that "at least four babies in [her] community died during that period. They did not even last a week after the sprayings. They died within days of each other." Besides the fact that the scientific evidence contradicts the allegations as to human deaths, and that Ecuador has acknowledged so, Witnesses 11's and 12's last names show that they are sisters. However, Witness 12 just mentions the alleged death of four babies, without specifying that two of them were in fact her nieces. This detail also shows the falsity and pre-prepared nature of all the statements.

Finally, the same repetitive pattern is found in this statement:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Also, a few days after the fumigations, I felt uneasy and then I started itching a few days later, which disappeared a few weeks later."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "[I]mmediately my eyes started watering and I remember they burned a lot. I was never able to recover my sight. To this day, my eyes burn a lot and they are watery." "I got dizzy and then I vomited. My children suffered from headache, diarrhea and vomiting that lasted several weeks. I, too, suffered from headaches then and even now, there are days that I still get them."
- Loss of crops, and plants turning yellow. "After the sprayings, the crops dried up. The plants started turning yellow and then black, until all was lost." "The plants had been affected and we had to stop preparing remedies because they caused us more harm than good."
- Effects on soil and loss of productivity measured in quintals. "Now, we have harvested again but the land is not as fertile as before. Before, we would get around sixty quintals of maize per hectare on my farm. Now, we only harvest ten or fifteen quintals."
- Alleged impacts on animals. "The animals were also affected due to the sprayings. After each spraying, the chickens and pigs died. We had to bury them, because we were told that it was not good to eat them. I also saw a lot of dead fish in the days after the sprayings."

[124] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

- He/she had never experienced anything similar before. “We had never experienced such a severe damage on our land.” “[N]othing similar had ever happened to us before.”
- Final dramatic statements. “The plants had been affected and we had to stop preparing remedies because they caused us more harm than good. Now, we have to take our children to a health centre”.

Witness 13

(EM, Vol. IV, Annex 201)

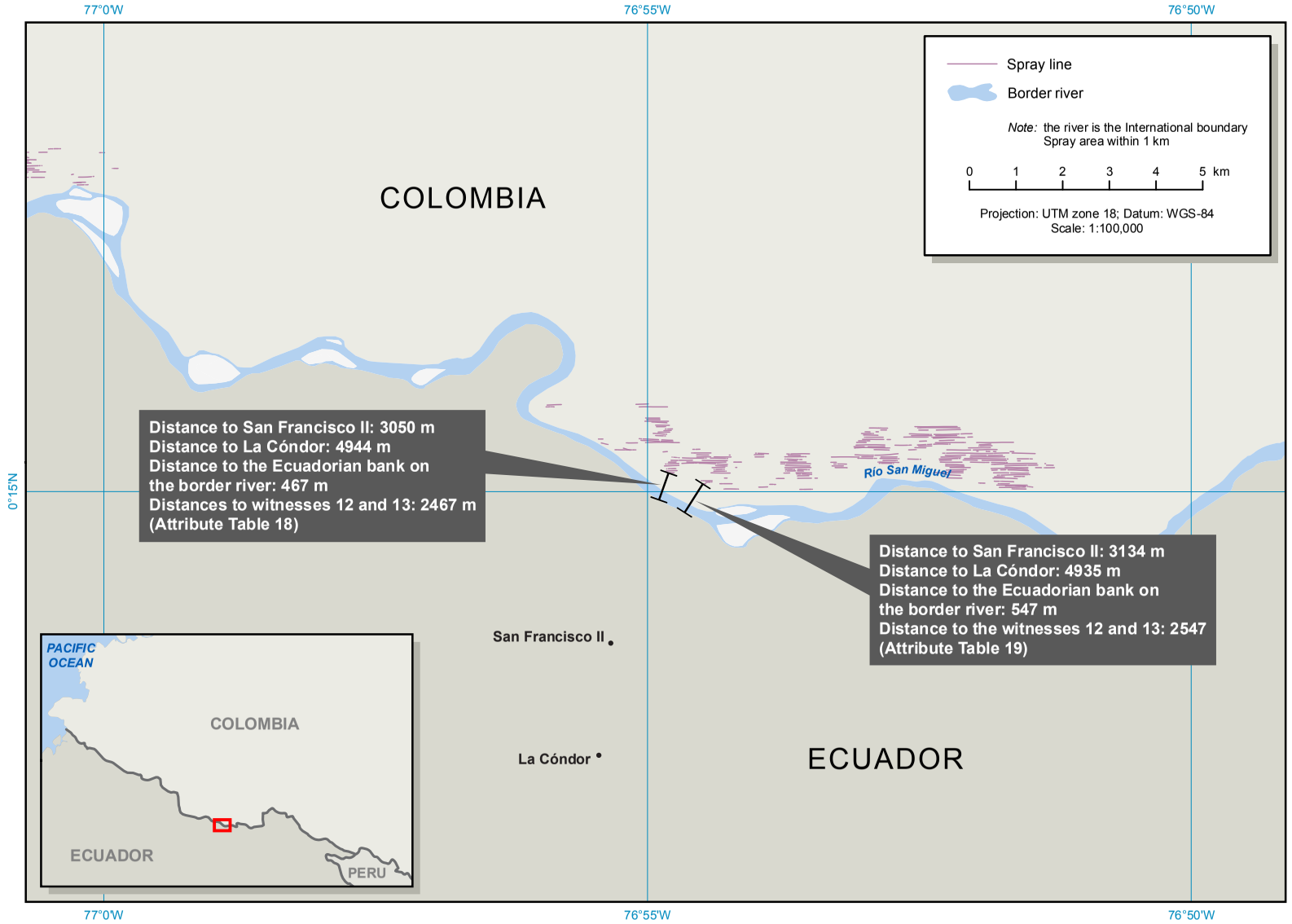


Figure 9. San Francisco II and La Cóndor, Spray Lines in 2002 (Witnesses 12-13-17)

San Francisco II and La Condor, 2002 (Witness 13)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15724	528	I222A#DC.B99	301-1	Right	168	10:59:30:80	0.25294071	-76.91334732	1068	0,890	0,1	20	19,900	136,100	0	0	I222A#CC	6,077	0209	50	T-65	Coca	T-65 Coca
PARAMETERS		22 September 2002				10:59			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
324	279	45

Attribute Table 18

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15758	562	I222A#DC.B99	301-1	Right	174	11:05:10:20	0.25123216	-76.90809108	1062	0,770	0,1	21	0,100	143,300	0	0	I222A#CC	6,399	0209	50	T-65	Coca	T-65 Coca
PARAMETERS		22 September 2002				11:05			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
322	279	43

Attribute Table 19

SAN FRANCISCO II AND LA CÓNDOR:

Distance of the two closest spray lines to San Francisco II location: 3,050 metres and 3,134 metres, over three kilometres.

Distance of the two closest spray lines to La Cóndor location: 4,944 metres and 4,935 metres, nearly five kilometres.

Distance to the Ecuadorian bank on the border river: 467 metres and 547 metres.

Distance of the two closest spray lines to witnesses 12 and 13 locations: 2,467 metres and 2,547 metres, nearly two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 0.75 g/ha and 0.41 g/ha, respectively.[125] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[126] This shows that no damage could have been caused in Ecuador.

[125] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16 and 30.

[126] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 13:

The witness states that "[f]or the past twenty-three years, [she] ha[s] been living in La Cóndor, San Francisco II, Sucumbíos", and that her "fifty-two hectare farm is located two or three kilometers from the border with Colombia." She claims that in the year 2002, two or three planes protected by helicopters sprayed over her community. Allegedly, two weeks later the effects started to appear.[127]

According to the Spray Data from the Department of State, in 2002 (Figure 9) the closest events were sprayings on Colombian territory, at a distance of 2.5 kilometres from the witness's reported location ("[m]y... farm is located two or three kilometers from the border", therefore 2 km was taken as the figure). Yet, the witness claims that "two or three planes protected by helicopters sprayed over [his] community." The falsehood is evident.

These distances also render impossible the alleged oily water that the witness describes. Indeed, she states that "[d]uring the spraying period, [she] noticed that the water was oily, but [her family] still used it because [they] had no choice. It was as if the water had been mixed with oil." In addition, drift could not have resulted in any of the damages complained of by the witness, not even in plants and crops and even ignoring general wind trends in the area.[128] Hewitt's modeling of these events resulted in estimated deposition values of 0.75 g/ha and 0.41 g/ha,[129] insignificant even for the most sensitive species.[130]

This was further evidenced by Evans, who conducted an analysis to identify and quantify vegetation changes that occurred within the area from September 12 to October 14, 2002, using satellite images. He concluded that no significant change in vegetation condition is evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[131]

The statement's falsehood has been shown. But the witness still follows the same structure from the other witness statements.

---

127 EM, Vol. IV, Annex 201.

128 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

129 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16 and 30.

130 The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.

131 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. “One morning, I went to check the farm wearing sandals and short pants, and the liquid sprayed on the grass brushed against my legs. A few days later, I had a rash all over my body. To this day, I am not cured. The itching is exasperating and I hurt even more on account of the itching. I remember my daughter crying out of desperation because she had bathed in the water from the streams, which had been sprayed with the fumigation liquid. To this day, she has bumps on her skin and they will not heal either.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “The young children were affected more than the adults by the sprayings. Many children had to miss school for several days since they were sick with vomiting, diarrhea and a headache. It is unfortunate that so many children died in San Francisco II during this time.”
- Loss of crops, and plants turning yellow. “I had planted around ten hectares of maize, rice, coffee, plantain, and yucca. Approximately two weeks after the spraying, I went to the farm and I saw that the field was dry and yellow. Little by little the plants turned yellow.”
- Effects on soil and loss of productivity measured in quintals. “Some months later, I planted again, but the land is no longer good. The land has been left barren.” “The land that we have no longer produces”.
- Alleged impacts on animals. “On the farm, my family and I raised chickens, horses, cows, and dogs. The animals began to die”. “The two-month-old calves started losing their hair, they had nothing left but skin, and they died. Many cows miscarried or their offspring were born with malformations. Several chickens were found dead, the following morning, under the tree where they had slept. The dogs that we used for hunting suffered from a dry cough, difficulty in breathing, and died.”
- He/she had never experienced anything similar before. “This was the first time that this had happened to me; the whole harvest was ruined.” “I never had any problems with the animals on the farm”.
- Final dramatic statements. “Before the sprayings, we lived happily. Now, we have nothing. […] If I had a chance I would leave this community, but I have nowhere to go nor is anyone interested in buying my farm and lands, which are damaged”.

This witness also seems to imply an additional alleged effect: that the mixture moves along the food chain and, for that reason, “[the dead animals] had to be buried”. However, this is also contradicted by the scientific evidence. Indeed, CICAD I states that glyphosate has a

short-lasting biological activity on soils and water; it is not biomagnified, *does not move along the food chain*, nor does it seep from ground soil through to subterranean waters.[132]

[132] See above para. 13.

Witness 14

(EM, Vol. IV, Annex 202)

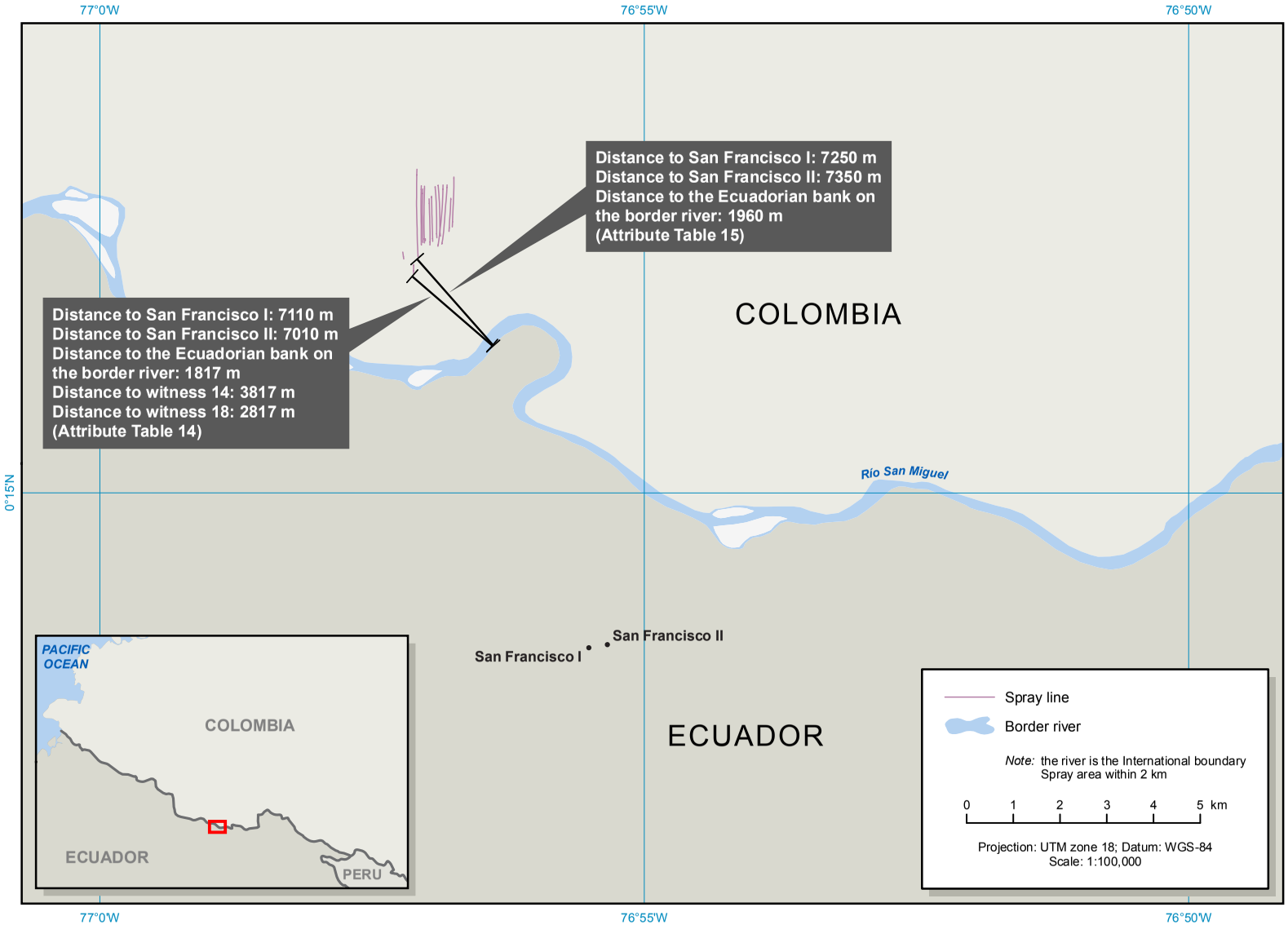


Figure 7. San Francisco I–II, Spray Lines in 2000 (Witnesses 14-18-19)

San Francisco I – II, 2000 (witness 14)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	I260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 14

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3360	002748	12:58:57.00	1,100	-81,45	177,280	3,560	1	0	0,900	12	9	12	100	I260cfac	1491,877	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:58	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	282	53

Attribute Table 15

SAN FRANCISCO I AND SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco I location: 7,110 metres and 7,250 metres, over seven kilometres.

Distance of the two closest spray lines to San Francisco II location: 7,010 metres and 7,350 metres, over seven kilometres.

Distance of the closest spray line to witnesses 14 and 18 location: 3,817 metres and 2,817 metres, respectively.

Distance of the two lines to the Ecuadorian bank on the border river: 1,817 metres, nearly two kilometres, and 1,960 metres, nearly two kilometres.

Hewitt modeled these events and estimated a deposition value of 0.01 g/ha each.[133] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[134] This shows that no damage could have been caused in Ecuador.

[133] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71.

[134] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 14:

The witness states that "from [his] house, the San Miguel River is less than two kilometres, which as *[sic]* measured by a topographic team when [he] bought [his] land." He claims that he has "worked as a farmer in the San Francisco II Community, province of Sucumbíos, Ecuador, for the past twenty-eight years." He says that "[o]ver the years, [he] ha[s] observed planes spraying in this area several times. The first time the planes came from Colombia, [he] saw them fly over the San Miguel River." Shortly after that, the effects started appearing. The witness also alleges that with the following spraying cycles, his family got sick again.[135]

Since the testimony is so vague as to dates of the alleged first spraying, there is no alternative but to infer that the witness must be alluding to the earliest possible year, i.e., 2000. The events shown above in Figure 7, were sprayings on Colombian territory, at the following distances: Over 7 km from the San Francisco II location; almost 4 kilometres from the witness's reported location ("[f]rom my house, the San Miguel River is less than two kilometres"); and nearly 2 kilometres from the river bank of the Ecuadorian side of the border. Yet the witness claims that he "saw them fly over the San Miguel River. The planes came and went several times."

Dr Hewitt modeled these events and estimated a deposition value of 0.01 g/ha each.[136] In the circumstances, there was no significant deposition of spray mixture in Ecuadorian territory as a result of drift[137], even with disregard of the general wind trends in the area,[138] and could not have resulted in none of the alleged effects claimed by the witness, including plants and crops. The statement is evidently false.

This was further evidenced by Dr Evans, who conducted an analysis to identify and quantify vegetation changes that occurred within the area from September 12 to October 14, 2002, using satellite images. He concluded that no significant change in vegetation condition is evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[139]

---

135 EM, Vol. IV, Annex 202.

136 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71.

137 The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.

138 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

139 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the

The witness also goes as far as to claim that "[his] son who was born on thirty July of the year two thousand and one only lived forty-five days before dying. He was born thin and weak; shortly after birth, he got a strong fever. Several babies in our community died that year following the sprayings." The falsity of this outrageous accusation is evident not only from the fact that the sprayings were carried out too far from the witness's location, but also because it is scientifically impossible for the mixture to cause lethal effects, as was also acknowledged by Ecuador: "True, its effects on people might not necessarily be fatal…"[140]

Although the falsity has been proven, it is important to show how the witness follows the script prepared for him:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Shortly after that, bumps starting [*sic*] appearing on my skin and they itched. At that time, I had three children, who also got sick with bumps on their skin a week after the sprayings. At that time, my wife was pregnant. Bumps appeared on her and she felt a general discomfort of her body." "The bumps that appeared on my other children eventually disappeared."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "[My son] was born thin and weak; shortly after birth, he got a strong fever." "One could see that a lot of children in the community were sick with diarrhea and vomiting after the sprayings."
- Loss of crops, and plants turning yellow. "At the same time of our illnesses, the plantain bunches became black and stopped producing fruit. I saw that the same thing was happening on the farms of my other neighbors -- all the plants were dying […]". "The rice and maize were the most affected. Coffee could not produce either." "The few plants that grew again died after the new sprayings."
- This time the witness does not claim effects soil and subsequent loss of productivity.
- Alleged impacts on animals. "Also, my dogs lost their hair."
- He/she had never experienced anything similar before. "It was not normal at all for this to happen and it was very traumatic for everyone." "It was incredible, never before had we seen all the plants die at the same time."
- Final dramatic statements. "With the following spraying cycles, my family got sick again, and every time we had this horrible fear that we were going to lose another

---

few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

[140] ER, para. 2.4.

child." "We have been able to harvest some crops and we are trying to escape the poverty, which has resulted from this repeated loss."

Witness 17

(EM, Vol. IV, Annex 203)

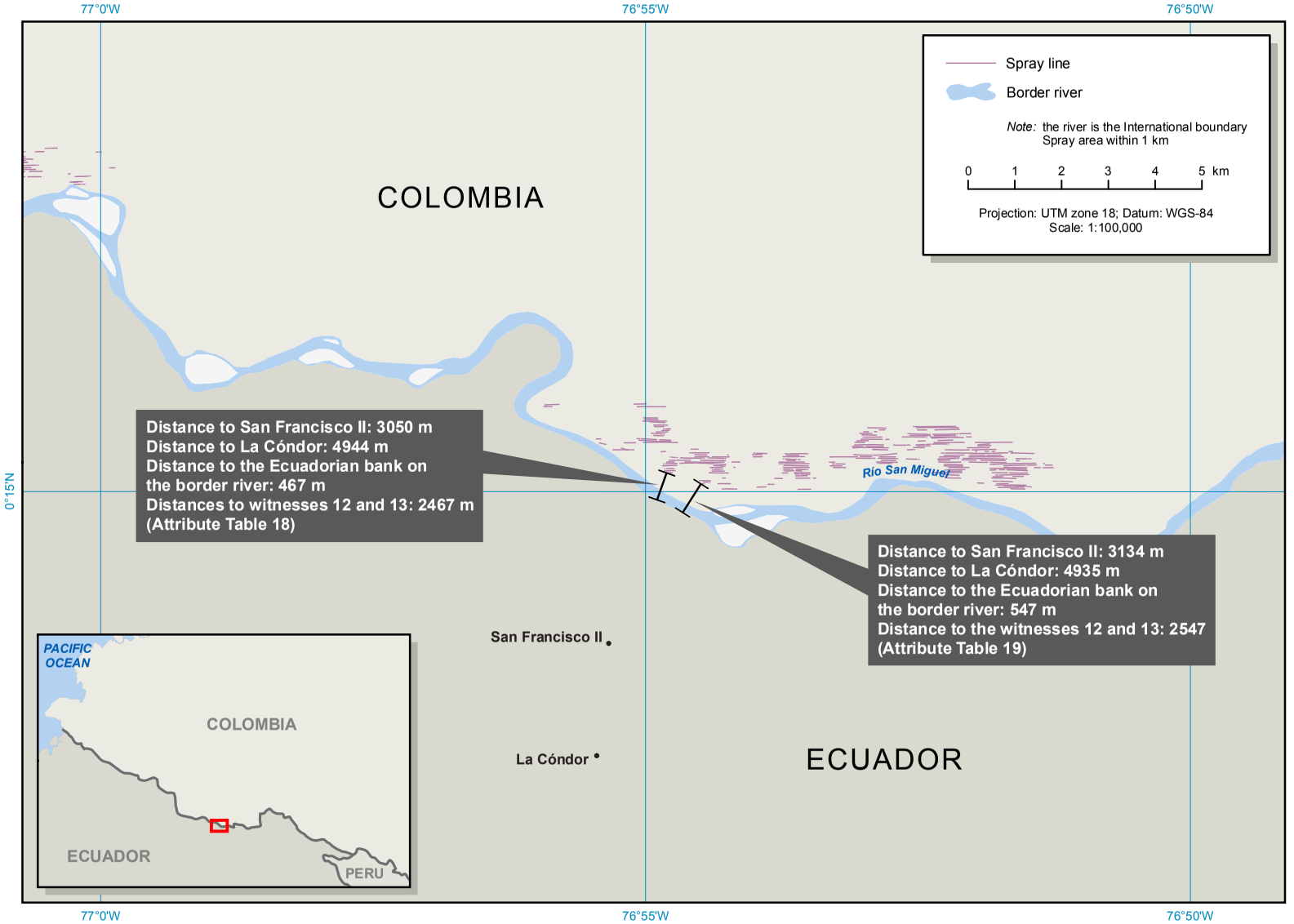


Figure 9. San Francisco II and La Cóndor, Spray Lines in 2002 (Witnesses 12-13-17)

San Francisco II and La Condor, 2002 (Witness 17)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15724	528	I222A#DC.B99	301-1	Right	168	10:59:30:80	0.25294071	-76.91334732	1068	0,890	0,1	20	19,900	136,100	0	0	I222A#CC	6,077	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		22 September 2002				10:59			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
324	279	45

Attribute Table 18

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2002 (Witnesses 12-13)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15758	562	I222A#DC.B99	301-1	Right	174	11:05:10:20	0.25123216	-76.90809108	1062	0,770	0,1	21	0,100	143,300	0	0	I222A#CC	6,399	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		22 September 2002				11:05			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
322	279	43

Attribute Table 19

SAN FRANCISCO II AND LA CÓNDOR:

Distance of the two closest spray lines to San Francisco II location: 3,050 metres and 3,134 metres, over three kilometres.

Distance of the two closest spray lines to La Cóndor location: 4,944 metres and 4,935 metres, nearly five kilometres.

Distance to the Ecuadorian bank on the border river: 467 metres and 547 metres.

Distance of the two closest spray lines to witnesses 12 and 13 locations: 2,467 metres and 2,547 metres, nearly two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 0.75 g/ha and 0.41 g/ha, respectively.[141] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[142] This shows that no damage could have been caused in Ecuador.

[141] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16 and 30.

[142] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

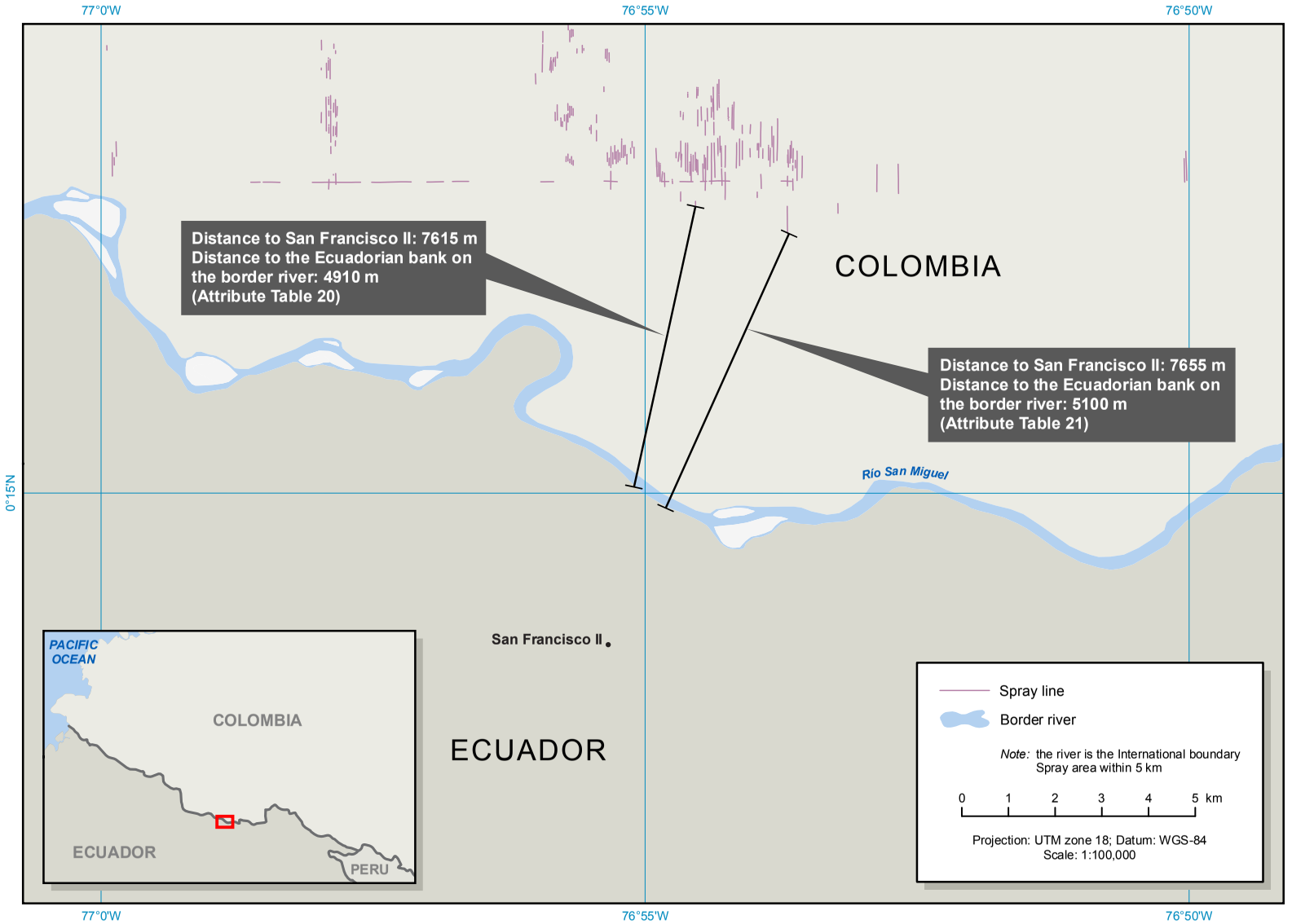


Figure 10. San Francisco II, Spray Lines in 2003 (Witnesses 11-17)

San Francisco II, 2003 (Witness 17)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2003 (Witness 11)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
2701	730	G103JJDC.B99	289-1	Right	333	14:04:35:80	0.29445543	-76.90890373	1173	0,770	0,1	26,1	33	178,300	2,5	0,060	G103JJDC	7,959	0307	50	T-65	Coca	T-65_Coca
PARAMETERS		10 July 2003				14:04			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
356	293	63

Attribute Table 20

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO II IN 2003 (Witness 11)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1412	291	G143CJAC.B99	289-1	Right	385	10:02:15:30	0.29426431	-76.89484179	1135	0,770	6,1	1504,2	27,500	168,100	2,500	3,453	G143CJAC	458,599	0307	50	T-65	Coca	T-65_Coca
PARAMETERS		14 July 2003				10:02			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
345	296	49

Attribute Table 21

SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco II location: 7,615 metres and 7,655 metres.

Distance to the Ecuadorian bank on the border river: 4,910 metres and 5,100 metres.

Hewitt modeled these events and estimated deposition values of 0.076 g/ha and 0.0645 g/ha, respectively.[143] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[144] This shows that no damage could have been caused in Ecuador.

[143] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 56 and 59.

[144] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 17:

The witness states that she lives in "La Carchi, province of Sucumbíos, a few kilometers from the border." She claims that "about six or seven years ago, [she] was on [her] farm when [she] saw two planes accompanied by helicopters fly over [her] community." The planes crossed over the river and passed over Ecuadorian territory, and then returned to Colombia. On their way, they dropped a whitish liquid." She then describes the alleged effects.[145]

Although neither in the *Memorial* nor in the *Reply* Ecuador locates the community La Carchi, it does indicate that this community corresponds to San Francisco II.[146] However, since the testimony is so vague as to dates of the alleged first spraying, there is no alternative but to infer that six or seven years ago would mean 2002 or 2003, in light of the date of the affidavit (16 January 2009). The two years are analysed separately.

For 2002, the event shown in Figure 9 was a spraying on Colombian territory, at a distance of over 2.5 kilometres from the witness's reported location ("... a few kilometres from the border", therefore 2 km was taken as the figure). For 2003, the event shown at Figure 10 was also a spraying on Colombian territory, at a distance of 7 kilometres from the witness's location. Yet, the witness claims that "the planes crossed over the river and passed over Ecuadorian territory, and then returned to Colombia." The falsehood is evident.

In addition, Hewitt modeled these events and estimated deposition values of 0.75 g/ha, 0.41 g/ha, 0.076 g/ha and 0.0645 g/ha, respectively.[147] Again, even assuming that wind was blowing towards Ecuador, which is not usually the case[148], deposition of the spray mixture in Ecuadorian territory as a result of drift was insignificant,[149] and therefore all of the alleged effects claimed are false, even the alleged loss of crops and plants turning yellow.

This was further evidenced by Evans, who conducted an analysis to identify and quantify vegetation changes that occurred within the area from September 12 to October 14, 2002, using satellite images. He concluded that no significant change in vegetation condition is

---

145 EM, Vol. IV, Annex 203.

146 ER, para. 3.51, fn. 498.

147 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 16, 30 56 and 59.

148 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

149 The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.

evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[150]

But, once again, the statement does not end without mentioning the common alleged effects and dramatic statements in a structured and evidently pre-prepared fashion:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Weeks later, my hands and feet broke out in a rash and spots which caused an intense itch. This disease on the skin took several months to disappear."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "A few minutes after the planes passed over us, I felt like there was fire in my eyes and a strong headache." "The headache has been the most difficult, because even now I suffer from severe headaches and dizziness. A few days after the sprayings, my children had vomiting and a fever that lasted for several days."
- Loss of crops, and plants turning yellow. "Ten days after the sprayings the crop started to turn yellow, until it dried up completely. The yucca had rotted inside. The plantains became dry and black."
- Alleged effects on soil and loss of productivity. "We waited a few months and then we replanted. Now, we have maize but it does not produce as much as it used to, the fruit often comes out hard. Work is done little by little, it requires a lot of care, but it grows only a little and then dries up."
- Alleged impacts on animals. "The animals were also affected. Two cows that we had miscarried. We lost a horse, a cow and some pigs. Chickens turned up dead under the trees."
- He/she had never experienced anything similar before. "We lost everything we had. We had never seen anything like it."
- Final dramatic statements. "The fumigations have made it difficult for us to keep many of our traditions." "It has been very difficult to get by in our community." "Our only hope is that they do not spray again, but we live in fear because they have sprayed several times since that first time." "I decided that we must stay to defend our land and life – to take it".

[150] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

Witness 18

(EM, Vol. IV, Annex 204)

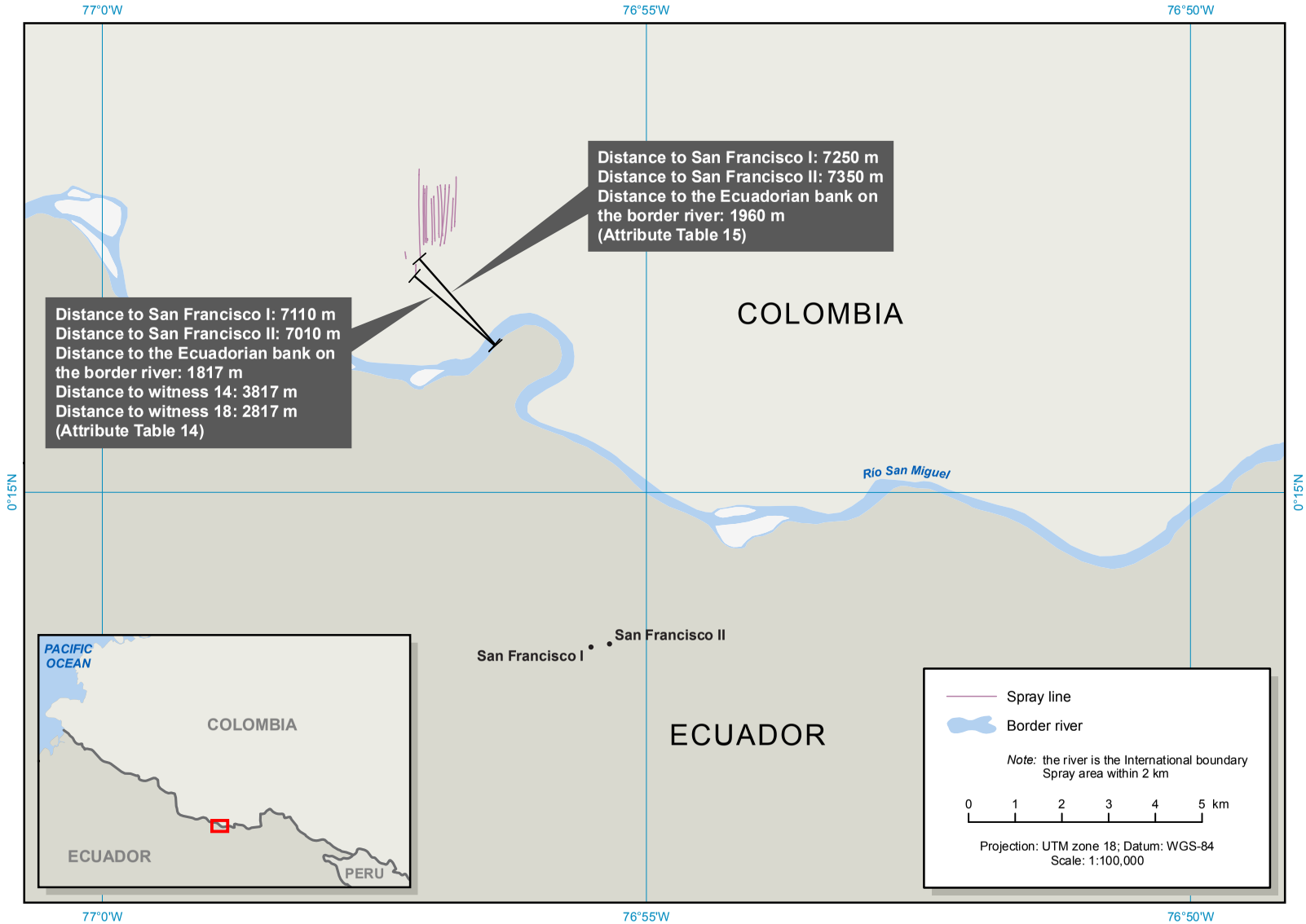


Figure 7. San Francisco I–II, Spray Lines in 2000 (Witnesses 14-18-19)

San Francisco I – II, 2000 (witness 18)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	l260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 14

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3360	002748	12:58:57.00	1,100	-81,45	177,280	3,560	1	0	0,900	12	9	12	100	l260cfac	1491,877	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:58	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	282	53

Attribute Table 15

SAN FRANCISCO I AND SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco I location: 7,110 metres and 7,250 metres, over seven kilometres.

Distance of the two closest spray lines to San Francisco II location: 7,010 metres and 7,350 metres, over seven kilometres.

Distance of the closest spray line to witnesses 14 and 18 location: 3,817 metres and 2,817 metres, respectively.

Distance of the two lines to the Ecuadorian bank on the border river: 1,817 metres, nearly two kilometres, and 1,960 metres, nearly two kilometres.

Hewitt modeled these events and estimated a deposition value of 0.01 g/ha each.[151] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[152] This shows that no damage could have been caused in Ecuador.

[151] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71.

[152] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 18:

The witness states that she has lived in San Francisco I for twenty-five years. She claims that the first time that the sprayings occurred she was clearing the ground with a friend in preparation for planting watermelons, about a kilometre from the San Miguel River, and that at ten in the morning, the spraying started. Then the witness describes the alleged effects. She further holds that "[the crops] dried up again when the planes returned and sprayed in the following years."[153]

There is no indication as to date, but according to the Spray Data from the Department of State, the "first time" the sprayings were conducted near that area was in the year 2000. The events shown in Figure 7 were sprayings in 2000. All of them were carried out on Colombian territory, at least at the following distances: Over 7 kilometres from the San Francisco I location; almost 3 kilometres from the witness's reported location ("...the first time... I was... about a kilometre from San Miguel River"); and nearly 2 kilometres from the river bank of the Ecuadorian side of the border. Yet, the witness implies that the planes sprayed over Ecuadorian territory: "The planes crossed the river to the Ecuadorian side and turned around near Mrs. Meche's farm. We could see the planes spraying a liquid as they passed by." And he further says: "At first, I could hear the noise of the planes and then I began to smell a nasty odor in the air." The falsehood is evident.

Hewitt estimated a deposition value of 0.01 g/ha for each event.[154] Therefore, drift could not have resulted in significant deposition, or in any of the alleged effects complained of by the witness, even if the wind was blowing toward Ecuador, which is not the general trend. In fact, the deposition level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[155] Thus, no damage could have been caused in Ecuador.

This was also confirmed by Dr Evans. After conducting an analysis on satellite images to identify and quantify vegetation changes that occurred within the area from September 12 to October 14, 2002, he concluded that no significant change in vegetation condition is evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[156]

---

153 EM, Vol. IV, Annex 204.

154 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71.

155 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

156 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the

With regard to the alleged effects, this time the witness goes as far as to claim that she suddenly felt pain in her throat and it felt raw. Then she adds: "To this day, I still have health problems, every morning I have a pus-like [substance] in my throat and I have to spit it out." Nothing like that, as shown above, could possibly happen.[157] But then she follows the usual prepared lines:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Also, my face was burning and my skin broke out in a rash." "A few days later, bumps appeared on parts of my body that had not been covered by my clothes, and they itched. Where my arms were covered by sleeves, there were only small bumps, and they did not bother me as much. But the other bumps burned." "Shortly after the spraying, three of [my children] became sick with bumps on their skin".
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "Shortly after the spraying, three of [my children] became sick with […] vomiting, nausea, and diarrhea."
- Loss of crops, and plants turning yellow. "At the same time, shortly after the fumigations, the plantain died. The maize stalks withered and turned yellow." "[D]uring those days, all the plants were affected, from pasture to fruit trees. Nothing survived. The yucca died before the other plants."
- Alleged effects on soil and loss of productivity. "We have replanted yucca, but to this day, despite cooking the yucca, it is hard and inedible." "After that month, we tried replanting the crops but the plants did not do well."
- Alleged impacts on animals. "Also, four of the eight pigs died. They lost hair off their backs and they rolled around on the ground as if something had bitten them, the same thing with the dogs. We also had four cows and they died."
- He/she had never experienced anything similar before. "I had never seen this type of disease in plants before." "It was also rare and very difficult for the disease to have affected the plants, people and animals all at the same time – I had never seen anything like it in my life."
- Final dramatic statements. "After all the problems caused by the fumigations, eight of my children decided to look for a job in the highlands, and they do not want to return because they are afraid; they hear an airplane and they think that they are going to spray again." "For now, we hope that the planes do not spray again and steal our new investment".

---

few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

[157] See above paras. 5-11.

Witness 19

(EM, Vol. IV, Annex 205)

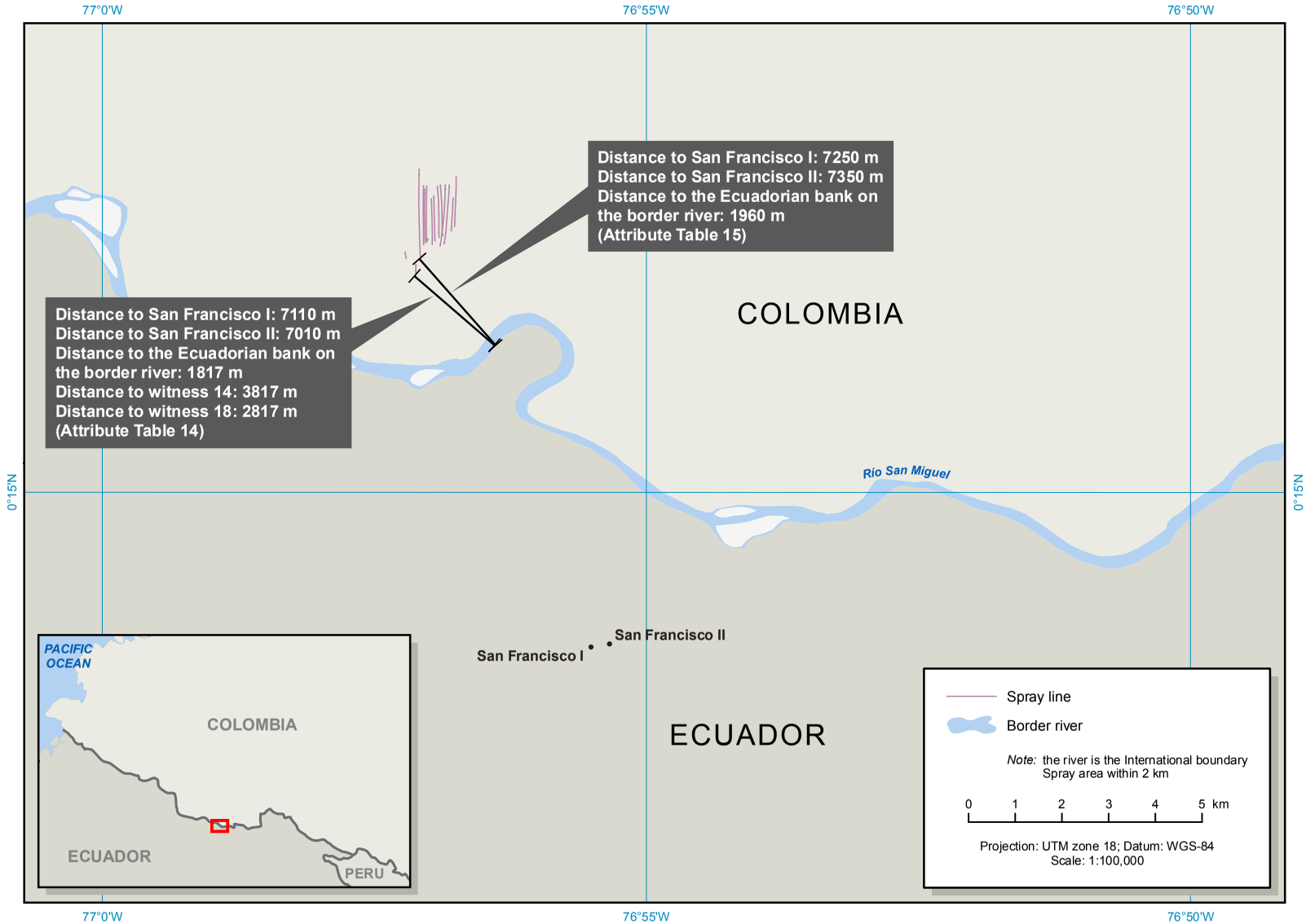


Figure 7. San Francisco I–II, Spray Lines in 2000 (Witnesses 14-18-19)

San Francisco I – II, 2000 (witness 19)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3813	002721	12:59:06.39	1,100	-39,59	194,200	3,600	1	0	1	8	8	0	-1	I260kdac	152,977	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:59	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	281	54

Attribute Table 14

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO SAN FRANCISCO I Y II IN 2000 (Witnesses 14-18-19)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
3360	002748	12:58:57.00	1,100	-81,45	177,280	3,560	1	0	0,900	12	9	12	100	I260cfac	1491,877	0012	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		12:58	FEET		MILES/HOUR									26 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
335	282	53

Attribute Table 15

SAN FRANCISCO I AND SAN FRANCISCO II:

Distance of the two closest spray lines to San Francisco I location: 7,110 metres and 7,250 metres, over seven kilometres.

Distance of the two closest spray lines to San Francisco II location: 7,010 metres and 7,350 metres, over seven kilometres.

Distance of the closest spray line to witnesses 14 and 18 location: 3,817 metres and 2,817 metres, respectively.

Distance of the two lines to the Ecuadorian bank on the border river: 1,817 metres, nearly two kilometres, and 1,960 metres, nearly two kilometres.

Hewitt modeled these events and estimated a deposition value of 0.01 g/ha, each.[158] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[159] This shows that no damage could have been caused in Ecuador.

[158] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71

[159] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 19:

The witness states that he has "worked as a farmer in San Francisco I, Sucumbíos, for twenty years, ever since [he] was a child." He claims that "[w]hen the first spraying occurred, [he] was at [his] house. In the sky, *above the bank of the river*, there were two planes and two helicopters." Then he adds that shortly after the spraying the alleged effects began.[160] There is no indication as to date, but according to the Spray Data from the Department of State, the "first spraying" near that area was in the year 2000.

Indeed, the events shown in Figure 7, were sprayings on Colombian territory, at distances of over 7 kilometres from the San Francisco I location, and nearly 2 kilometres from the river bank of the Ecuadorian side of the border. Yet, the witness claims that from his house he could see the planes *above the bank of the river*."

Furthermore, at the distances involved and with the general wind trends in the area,[161] none of the alleged effects could have possibly occurred. Indeed, Hewitt's modeling of these events resulted in an estimated deposition value of 0.01 g/ha for each event.[162] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[163]

Dr Evans also confirmed that no significant change in vegetation condition is evident during the time period discussed as would be expected if the spraying had caused the types of damages alleged by the witness.[164]

The falsehood is evident. But, moreover, the witness also follows the usual structure:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "[A]fter the sprayings, we experienced some kind of epidemic in which all the children in the community became sick with […] skin bumps. Immediately after the sprayings, my eight-month-old son was hospitalized for fifteen days, with […] bumps on his skin."

---

160 EM, Vol. IV, Annex 205.

161 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II,, Annex 19: IDEAM Climate Characterization (2011).

162 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 69 and 71.

163 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

164 See CR, Vol. II,, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.52- 3.69, pp. 14-38; "[I]t is technically impossible to attribute the effects alleged by the Ecuadorian witnesses to the spraying in Colombian territory, and the results corroborate my opinion to the effect that the few changes observed on the images in the San Francisco study area were much more likely a result of typical cultivation practices." *Ibid.*, para. 3.69, p. 64.

  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “At that moment, after the sprayings, we experienced some kind of epidemic in which all the children in the community became sick with vomiting, diarrhea […]. Immediately after the sprayings, my eight-month-old son was hospitalized for fifteen days, with diarrhea, vomiting […].” “We had diarrhea and vomiting, but not as bad as my son. We had it for a week.”
- Loss of crops, and plants turning yellow. “Shortly after they sprayed, all the plants died.” “The plantains did not develop fully, they remained thin and then dried up. The yuccas died. So did the coffee. The roots were dry.”
- Alleged effects on soil and loss of productivity. “Now, we can sow once again the land of San Francisco, but it does not produce like it did before. But as each day goes by after the sprayings, one can see that the productivity is improving little by little”.
- Alleged impacts on animals. “I had chickens and pigs. All the animals died. They died gradually. The animals started getting thin, all at the same time. They did not want to eat the grass that had turned yellow and dry after the sprayings”. “The neighbors had the same problem with their animals”.
- He/she had never experienced anything similar before. “In all the years that I have worked the land, I have never seen anything like it.”
- Final dramatic statements. “In the end, there was no food, and for the first time in my life I stopped working on my farm in San Francisco and found a job doing construction in Lago Agrio. I did it so that I could buy food in town. In other years when the plants died after the sprayings, since we had nothing to work with on our farms, we went to work in farms that were farther away from the border.”

Witness 20

(EM, Vol. IV, Annex 206)

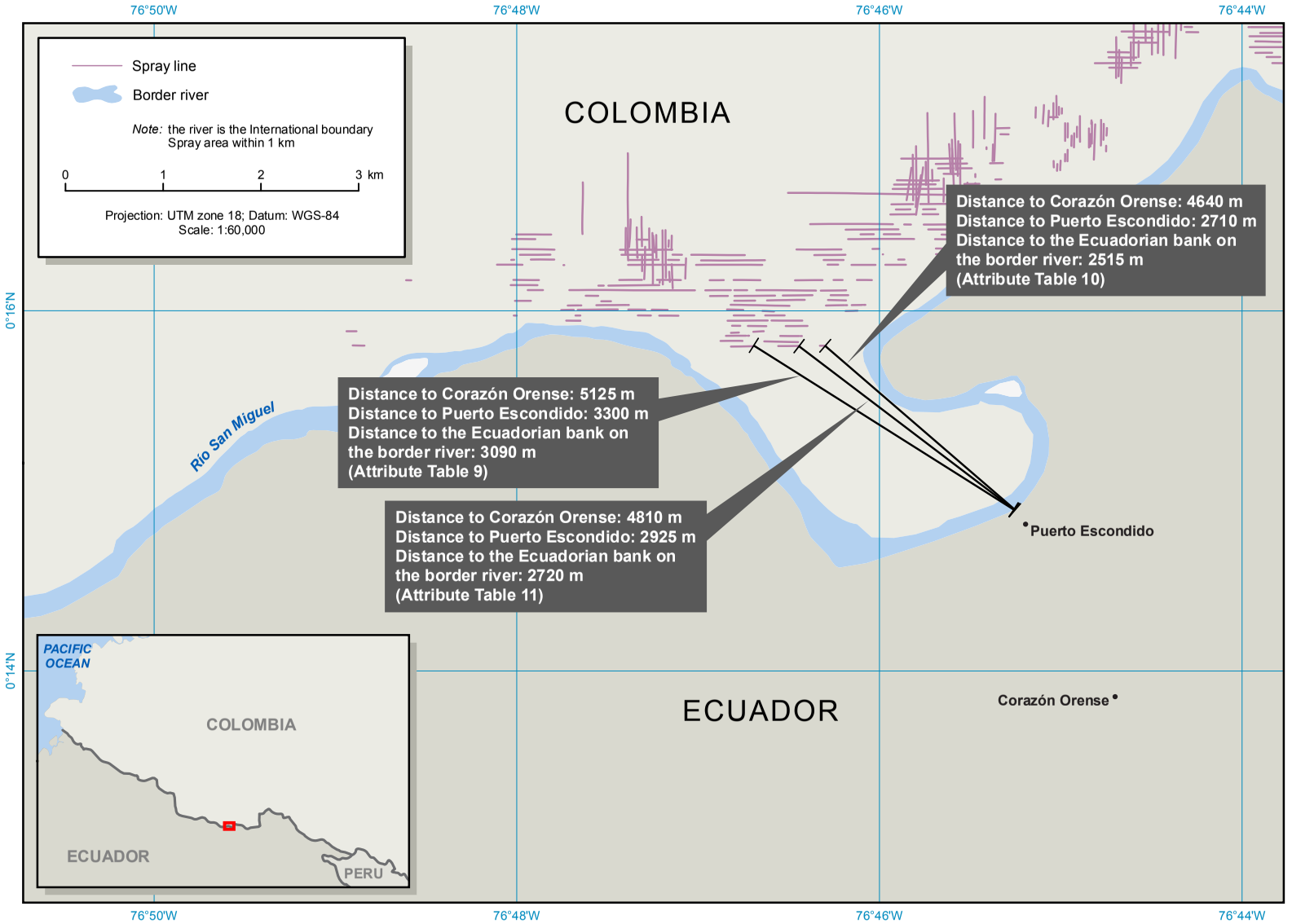


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 20)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[165] This shows that no damage could have been caused in Ecuador.

[165] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

Witness 20:

Witness 20 states that he lives "in Puerto Escondido, Ecuador, where [he has] a house and a farm". He describes the alleged effects of the first spraying that he remembers which was in 2002. "It was late in the morning." "The planes were flying like vultures fighting for food, going up and down repeatedly. They were dropping white liquid that extended throughout the air. In some areas it fell directly, in others it drifted with the wind." The only reference provided as to his location at the alleged time of the spraying is as follows: "I was with the pigs by the plantain fields."[166]

The events shown in Figure 5 were sprayings on Colombian territory, at distances of between nearly and over 3 kilometres from the Puerto Escondido location or between 2.5 and 3 kilometres from the Ecuadorian bank on the border river. Yet, the witness claims that the spray mixture smelled bad, he could barely stand it, he felt the mist go into his eyes, and "[i]n some areas it fell directly".

Dr Hewitt modeled these events and estimated downwind deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[167] This is an insignificant amount, as the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops. Therefore it could not have possibly caused any of the alleged effects in animals, plants and crops in Ecuador, much less considering the actual wind trends in the area.[168] The falsehood is evident.

But, moreover, the witness's lines were also prepared in the following fashion:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps.
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "I started to feel sick and I immediately returned home. I got a headache and dizziness". "Still, a few days later my seven children had stomach aches and diarrhea." "[A]lso, the other children in the community became sick with the same thing."
- Loss of crops, and plants turning yellow. "The plants died a week or two after the sprayings. The maize started to bend. I had three hectares of yucca and I was not able to harvest any; it all dried up. I also had ten hectares of coffee and cocoa, all of which turned yellow."

---

166 EM, Vol. IV, Annex 206.

167 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

168 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

- Alleged impacts on animals. “All of my 8 pigs died. At first they were very fat, we usually fed them *orito*, but after the fumigations the *oritos* were sick. The pigs did not want eat [*sic*] they became thin, and consequently they died.”
- He/she had never experienced anything similar before. “Before, they were healthy. They had never been sick like this before”.
- Final dramatic statements. “After what happened with the first spraying, I did not want to replant and lose all of my money again in the next spraying. I could have replanted yucca, but I was afraid it would be destroyed again”.

Witness 21

(EM, Vol. IV, Annex 207)

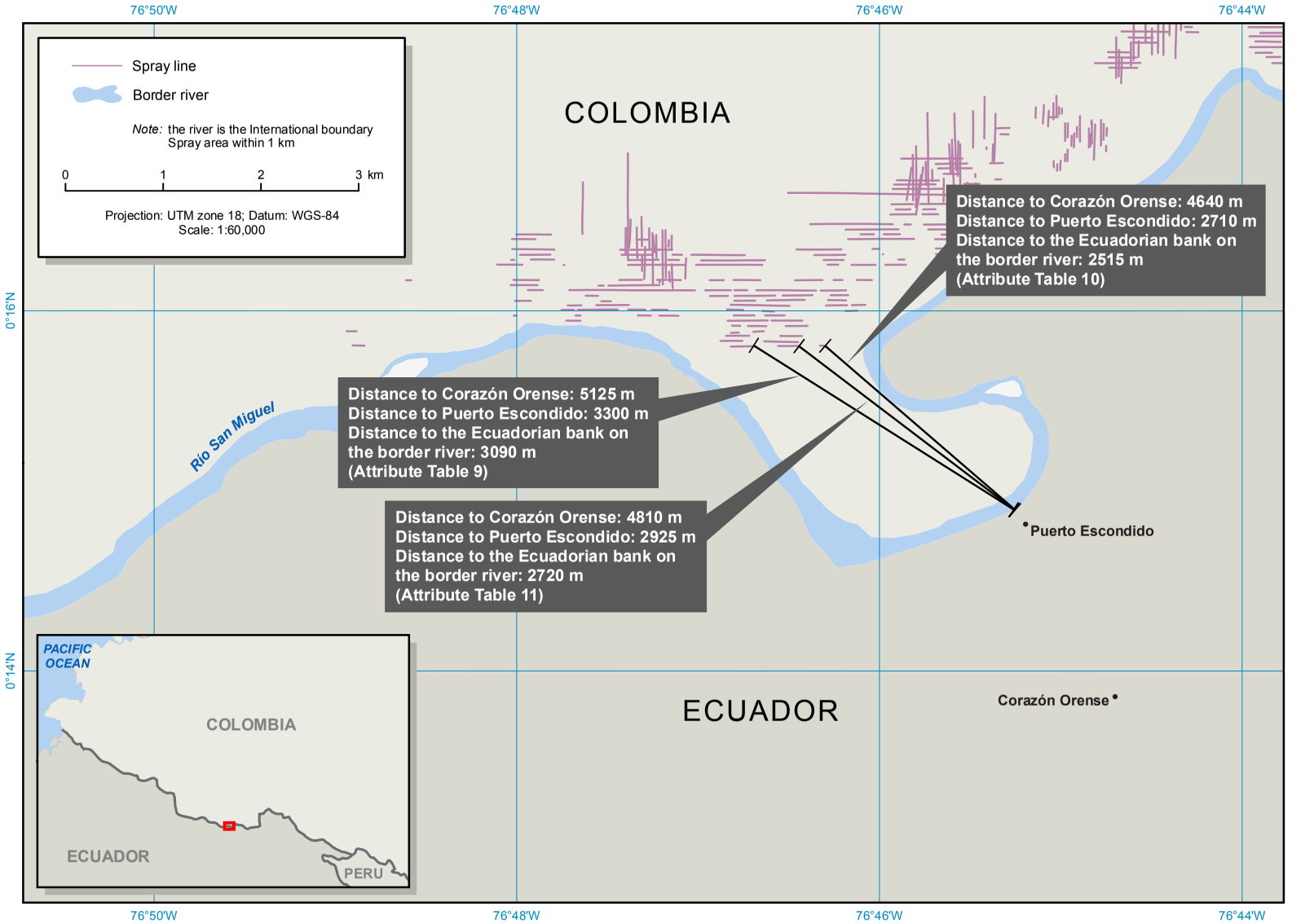


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 21)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[169] This shows that no damage could have been caused in Ecuador.

[169] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

Witness 21:

Witness 21 states that she has lived in Puerto Escondido, province of Sucumbíos, Ecuador, for the past eighteen years. Even though the witness does not mention a date or even a year, she states that "[she] was outside of [her] house when the first spraying occurred… One could see the planes very close, on the other side of the river."[170]

The events shown in Figure 5 were sprayings on Colombian territory, at distances of between nearly and over 3 kilometres from the Puerto Escondido location or between 2.5 and 3 kilometres from the Ecuadorian bank on the border river, and yet the witness claims that she could see the planes very close, on the other side of the river. The falsehood is evident.

She even claims that "[her] house is less than one hundred meters from the river and, if it were not for the forest, one could see the river from [her] kitchen." As Colombia has proven in the *Rejoinder*, canopy in fact acts as an effective barrier to drift.[171] Then, even if the wind was blowing towards Ecuador[172] the canopy described by the witness would have intercepted most of the spray mix, reducing it to amounts way below the level of concern even for the most sensitive species.

But the statement even goes further in its falsity claiming alleged effects that could not possibly happen, not even for plants and crops. Indeed, Hewitt modeled these events at the distances involved, and estimated insignificant deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[173] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[174] This shows that no damage could have been caused in Ecuador.

In this statement the script was not as complete as in the previous statements, but nevertheless most of the common elements are repeated, showing its pre-prepared nature:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps.

---

170 EM, Vol. IV, Annex 207.

171 See CR, Vol. I, Chap. 2, sec. B, paras. 2.122-2.126.

172 This is not usually the case according to the wind trends in the relevant area. See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

173 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

174 See CR, Vol. II,, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “With each spraying, all six [of my children] had a flu, with a runny nose, inflammation of the throat, chills and fever. They had trouble breathing.”
- Loss of crops, and plants turning yellow. “After each spraying, the maize plantations were damaged. The rice no longer grew, it became yellowish.”
- Alleged effects on soil and loss of productivity. “After this, the soil became weak. The crops that grew were weak, small and of poor quality. The quantities of maize harvested now are far less than what could be drawn from the earth before.”
- Alleged impacts on animals. “Both times, I had chickens that died. The first chicks born after the first spraying had no eyes and they were disfigured; they were very strange. Many of the chickens that were healthy before could no longer lay eggs, due to the lack of maize, since the plants had been damaged”.

Witness 22

(EM, Vol. IV, Annex 208)

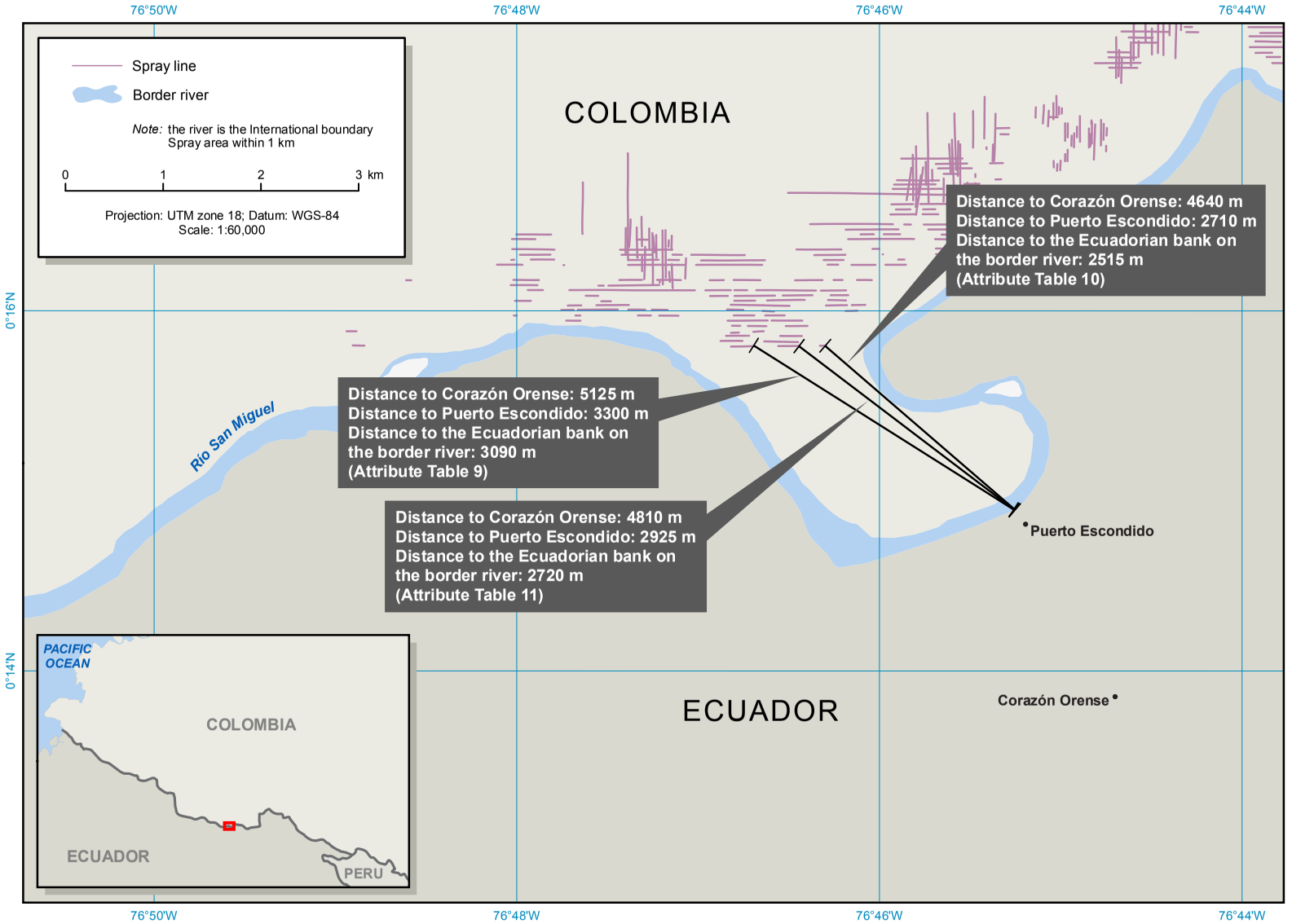


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 22)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[175] This shows that no damage could have been caused in Ecuador.

[175] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

Witness 22:

Witness 22 states that he lives in the community of Puerto Escondido, in the province of Sucumbíos, Ecuador, located on the edge of the San Miguel River, which borders Colombia. He claims that since the year 2002, or thereabouts, Colombia has sprayed around there approximately every six or eight months for a number of years. The witness describes the alleged impacts produced within a few weeks after "one of the first times".[176] Even though he does not provide any dates, according to the Spray Data from the Department of State sprayings near that area occurred for the first time in 2002.

Indeed, the events shown in Figure 5 were sprayings on Colombian territory in 2002, at distances of between nearly and over 3 kilometres from the Puerto Escondido location or between 2.5 and 3 kilometres from the Ecuadorian bank on the border river. Yet the witness claims that "[f]rom the planes came out a whitish smoke, and with the wind came a horrible smell. The smell was perceived most strongly maybe three hours after the spraying, and it remained for a prolonged period of time. The falsehood is evident.

Hewitt modeled these events and estimated downwind deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[177] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[178] This shows that no damage could have been caused in Ecuador, even if the wind had been blowing south, towards Ecuador.[179]

As for the common elements the witness claims the following:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "My nephews had red bumps on their skin".
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "I had strong headaches, and a recurring flu. I became so sick that I could not work nor take care of my farm." "My nephews had […] diarrhea, cough, and fever, and their eyes would turned red and burned."
- Loss of crops, and plants turning yellow. "The plants turned yellow, the maize no longer produced, the leaves from the coffee fell off".

---

176 EM, Vol. IV, Annex 208.

177 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

178 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

179 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

- Alleged effects on soil and loss of productivity. “Before they sprayed, I could harvest twenty five or thirty quintals from one or two hectares in my farm. Afterward, nothing was harvested. The land no longer supported the plants, and the few plants that came out were too small and of poor quality.”
- Alleged impacts on animals. “[T]he chickens no longer incubated their eggs. The chicks were born with no eyes, only with the cavities where the eyes should have been, and some were deformed with the beak longer than normal, the body crushed, and the legs crooked. They died a few hours after birth.” “The dogs got thin. At the same time, the pigs got sick and did not fatten up. Pregnant pigs, like the chickens, did not have good offspring. They were born weak and undernourished, and they were not well developed.” “In addition, shortly after the spraying, I saw dead *muchileros*. *Muchileros* are wild birds about the size of a small chicken with bluish-black feathers.”
- He/she had never experienced anything similar before. “I had never seen anything like it before [referring to the alleged blind chickens].” “Their mother had never seen her children like that, with so many problems at the same time, she did not know how to treat them.”
- Final dramatic statements. “We barely had anything to eat. We had no money to pay for my family, just as we had nothing to sell in the market. Now, as of two years ago, since there have been no sprayings, the soil has been improving; and we have some produce to sell”.

Witness 23

(EM, Vol. IV, Annex 209)

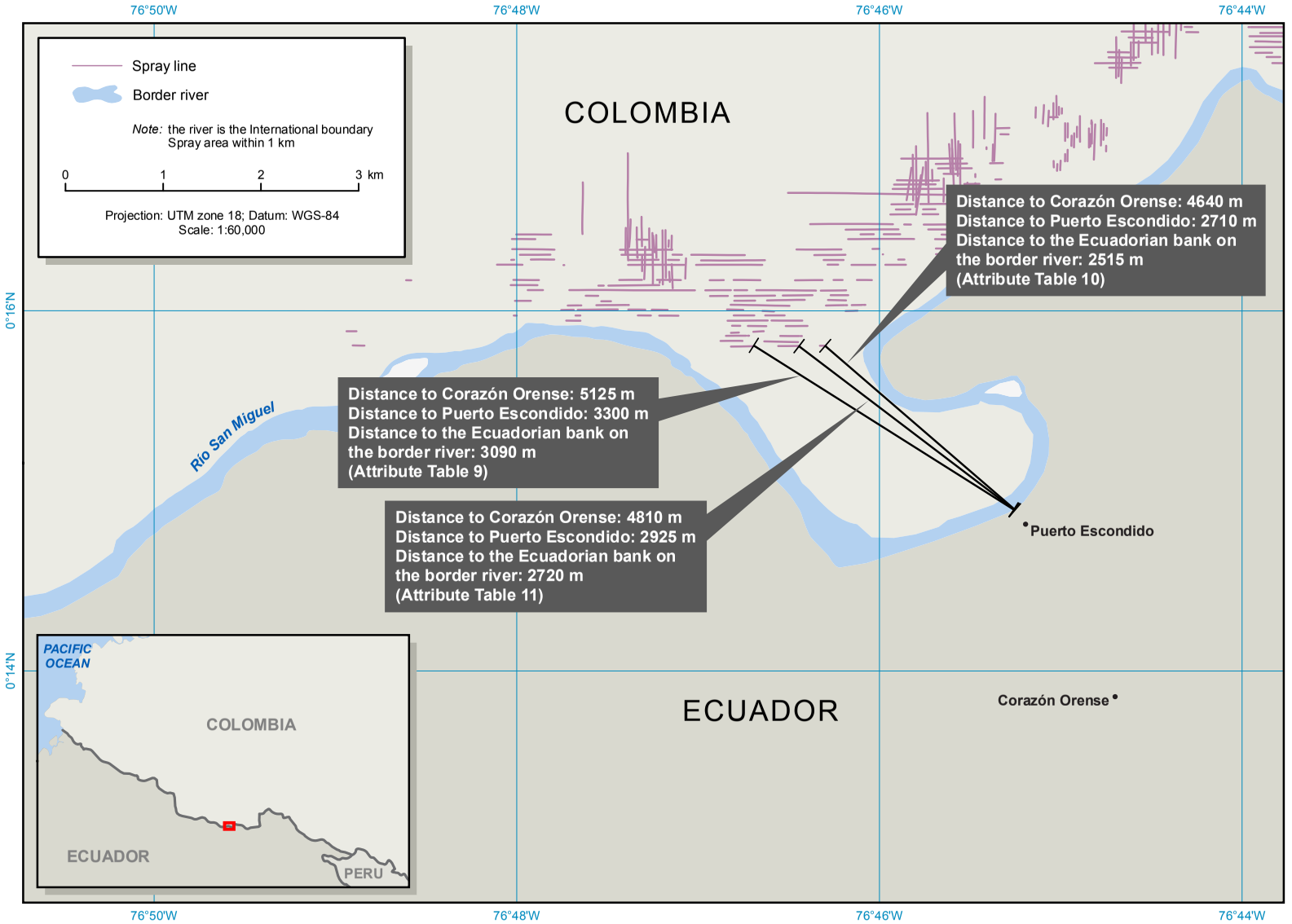


Figure 5. Corazón Orense–Puerto Escondido, Spray Lines in 2002 (Witnesses 8-9-20-21-22-23)

Corazón Orense – Puerto Escondido, 2002 (witness 23)

Metadata of the closest spray line

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1084	399	J102Q7AC.B99	302-1	Right	150	17:48:43:57	0.26335588	-76.78027357	1061	0,890	2,4	761,1	16,100	219,900	2,600	0	J102Q7AC	232,761	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
323	280	43

Attribute Table 9

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1086	401	J102Q7AC.B99	302-1	Right	150	17:48:52:74	0.26343991	-76.77209578	1028	0,890	0,6	211	10,200	224,800	2,300	0	J102Q7AC	64,493	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
313	265	48

Attribute Table 10

ATTRIBUTE TABLE OF THE THIRD CLOSEST SPRAY LINE TO CORAZON ORENSE - PUERTO ESCONDIDO IN 2002 (Witnesses 8-9-20-21-22-23)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1085	400	J102Q7AC.B99	302-1	Right	150	17:48:48:47	0.26340366	-76.77592492	1041	0,890	2,2	726	1,5	223	2,600	0	J102Q7AC	220,454	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		10 October 2002				12:48			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
316	274	42

Attribute Table 11

CORAZÓN ORENSE AND PUERTO ESCONDIDO:

Distance of the three closest spray lines to Corazón Orense location: 5,125 metres, over five kilometres; 4,810 metres, nearly five kilometres; and 4,640 metres, over four and a half kilometres.

Distance of the three closest spray lines to Puerto Escondido location: 3,300 metres, over three kilometres; 2,925 metres and 2,710 metres, nearly three kilometres each.

Distance of the three closest spray lines to the Ecuadorian bank on the border river: 3,090 metres, over three kilometres; 2,720 metres, nearly three kilometres; and 2,515 metres, over two and a half kilometres.

Hewitt modeled these events and estimated deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[180] This shows that no damage could have been caused in Ecuador.

[180] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.

Witness 23:

Witness 23 states that she lives in the town of Puerto Escondido, a community of about twenty houses, on the banks of the San Miguel River. She claims that the first time the sprayings came was in 2002 and she was working outside her house. "They were flying over Colombian territory up to the riverbank." Then she describes the alleged effects caused by that incident.[181]

As shown in Figure 5, in 2002 the spray events closest to Puerto Escondido were at distances of between nearly and over 3 kilometres from the Puerto Escondido location or between 2.5 and 3 kilometres from the Ecuadorian bank on the border river; yet the witness claims that "[a] few minutes [after the spraying], all of a sudden, [he] could not breathe. [His] throat closed up and [he] started choking, like when one breathes in dust."

The falsehood is evident. There is definitely no scientific evidence that the spray mixture cause this effect, much less at the distances involved. Even more, as shown in Figure 2-10,[182] personnel from different Colombian entities have witnessed the aerial spraying from the ground, at a very close distance from the spraying and none of these effects have never been reported.

But the distances involved also render impossible the alleged effects on plants, crops and animals. Hewitt confirmed this conclusion after modeling these events and estimating deposition values of 1.2 g/ha, 1.1 g/ha and 0.11 g/ha, respectively.[183] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[184] This shows that no damage could have been caused in Ecuador.

The falsity is even more evident in the witness'sallegations:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "A couple of days later, my skin also became irritated, bumps appeared and they itched intensely."
- Loss of crops, and plants turning yellow. "A week or two after I saw the planes spraying, the maize and rice were affected, drying up. The leaves of the plants had

[181] EM, Vol. IV, Annex 209.
[182] CR, Vol. I, Chap. 2, p. 112.
[183] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 10, 13 and 50.
[184] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

yellow spots, and then they turned completely yellow, fell off and, finally, the plants dried up completely."

- Alleged effects on soil and loss of productivity. "On my farm, I had a hectare of maize and a half hectare of plantain which either died or stopped producing. Three months later, we tried to sow the plants again, but the crops did not give us good products".
- Alleged impacts on animals. "After two days, the chickens, who had nothing to eat but the affected plants, started to make a noise as if they were choking and they died. One of my pigs that was pregnant also died the following day."

Witness 26

(EM, Vol. IV, Annex 210)

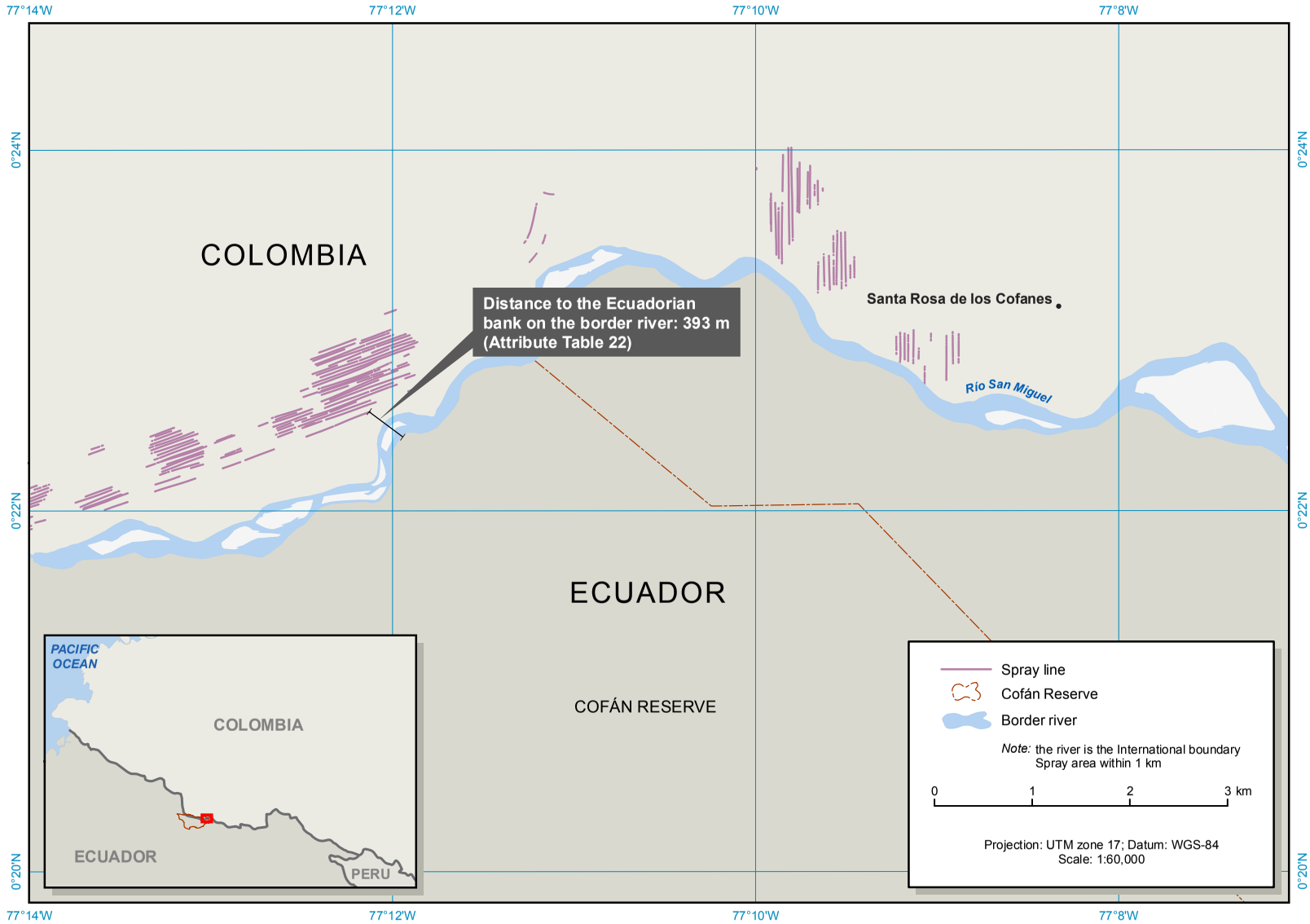


Figure 13. Cofán Bermejo Reserve, Spray Lines in 2002 (Witnesses 26-27-29-31)

Cofán Bermejo Reserve, 2002 (Witness 26)

Metadata of the closest spray lines

METADATO SEGUNDA LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2002 (Witnesses 26-27-29-31)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15196	358	I262A1BC.B99	287-3	Right	64	12:12:06:60	0.37580771	-77.20217690	1392	0,890	0,1	20,9	3,700	142,200	2,600	0	I262A1BC	6,363	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		26 SEPTEMBER 2002				12:12			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
423	362	61

Attribute Table 22

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 393 metres.

Hewitt modeled this event and estimated a deposition value of 0.700 g/ha.[185] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[186] This shows that no damage could have been caused in Ecuador.

[185] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 18.

[186] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

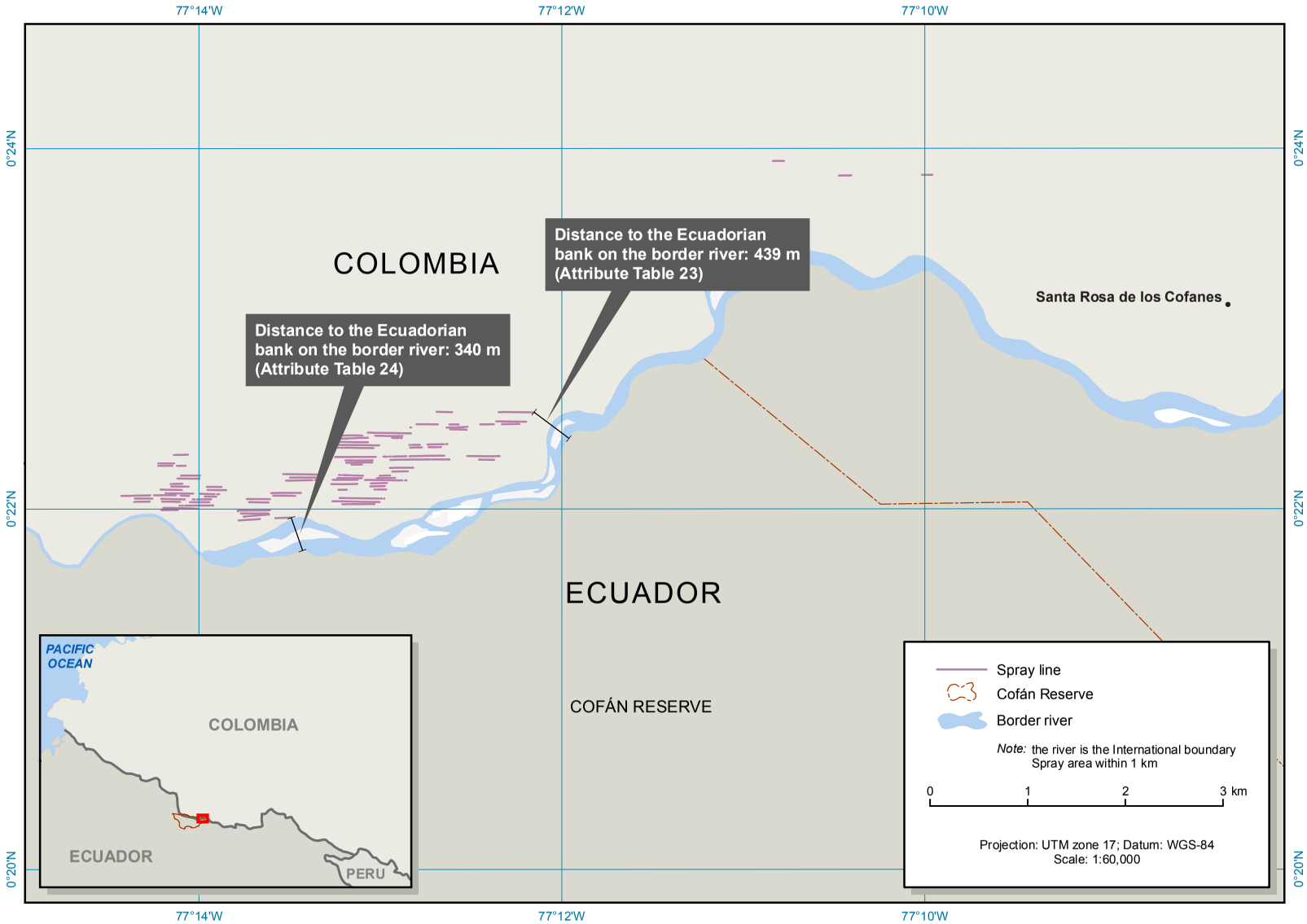


Figure 15. Cofán Bermejo Reserve, Spray Lines in 2004 (Witnesses 26-27-29-31)

Cofan Bermejo, 2004 (Witness 26)

Metadata of the closest spray lines

ATRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
947	4399	L244A1AC.B01	287-1	Right	51	8:27:20:30	0.37561924	-77.20586656	1322	0,77	4,7	1116,1	4,400	161,900	2,5	2,562	341,92	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 December 2004				08:27			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
403	380	23

Attribute Table 23

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
817	4264	L244A1AC.B01	287-1	Right	15	7:55:48:70	0.36581905	-77.22639118	1409	0,8	2,1	484,9	53	157,400	2,2	1,113	148,078	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 DECEMBER 2004				07:55			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
429	396	33

Attribute Table 24

COFÁN BERMEJO RESERVE:

Distance of the closest spray lines to the Ecuadorian bank on the border river: 340 and 439 metres.

Hewitt modeled these events and estimated deposition values of 0.506 g/ha and 0.0833 g/ha, respectively.[187] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[188] This shows that no damage could have been caused in Ecuador.

[187] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 28 and 54.

[188] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

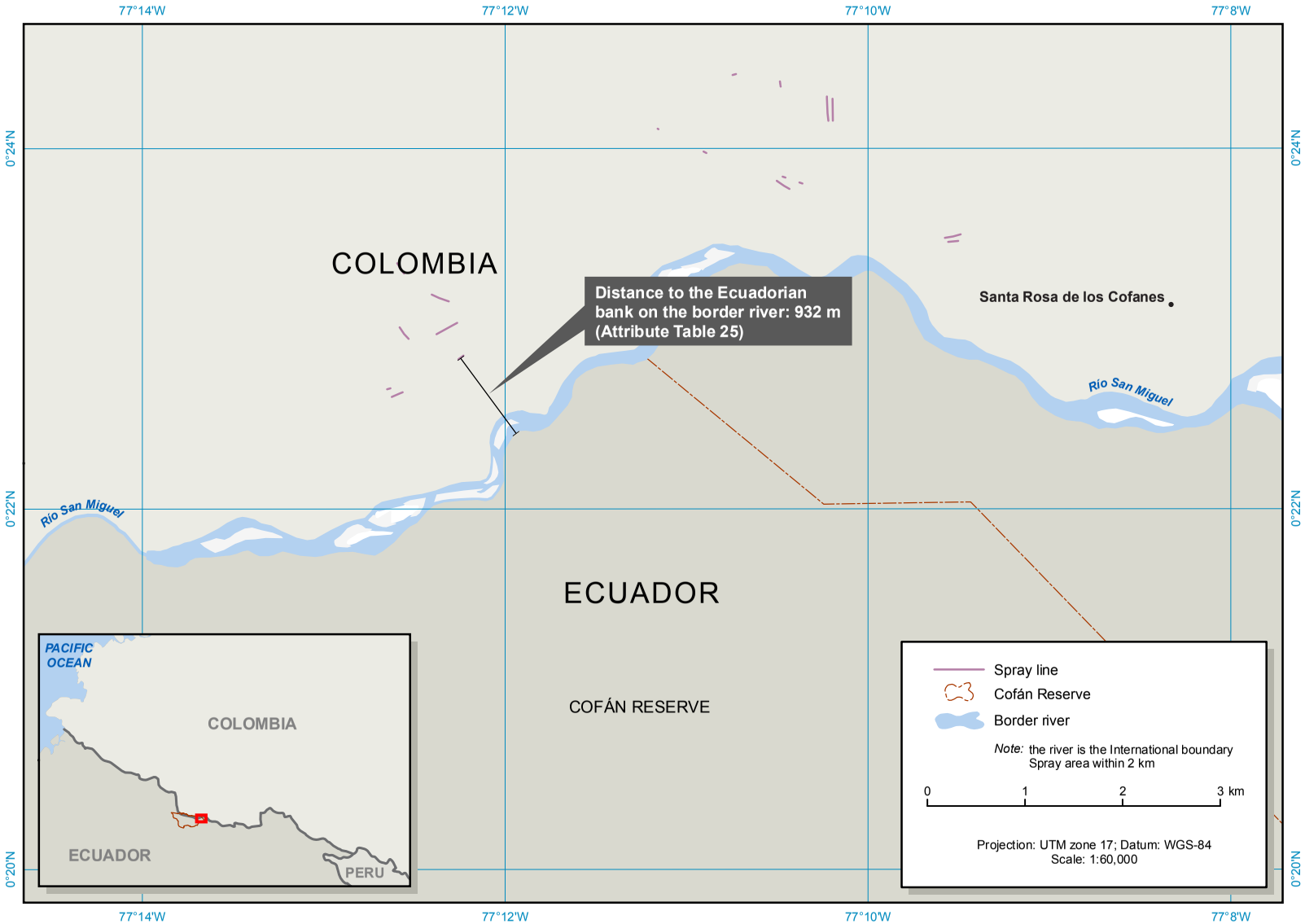


Figure 18. Cofán Bermejo Reserve, Spray Lines in 2007 (Witnesses 26-27-29-31)

Cofan Bermejo, 2007 (Witness 26)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2007 (Witnesses 26-27-29-31)																					
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	GROUP
70	4257	A147&VAC.B99	287-3	---	1	21:17:48:99	0.38050949	-77.20436179	416	1,100	0,76	64,023	4195,700	188,400	5,900	0,332	64,048	0701	85	AT802	AT802_Coca	Lobo
PARAMETERS		14 JANUARY 2007				11:17			METERS					MILES/HOUR								

ADDED ATTRIBUTES	
Ground Altitude over MSL (Metres)	Spray Line Altitude over
367	49

Attribute Table 25

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 932 metres.

Hewitt modeled this event and estimated a deposition value of 0.6199 g/ha.[189] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[190] This shows that no damage could have been caused in Ecuador.

[189] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 23.

[190] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 26:

The witness states that she lives in the *Avie* Community, also known as *Tayusu Kankhe*, which is located next to the San Miguel River, in the Cofán-Bermejo Ecological Reserve, near the border of the Colombian regions of Putumayo and Nariño. She claims that "[t]he first time [they] saw the sprayings [they] were very frightened. The planes brought smoke with them and they passed over [her] house."[191]

Witnesses 26, 27, 29 and 31 all live in the Cofán Reserve and in Avie Community, also known as Sukie Kankhe.[192] In order to determine the area where the sprayings and their allegedly adverse effects were witnessed, Colombia has taken the following into account: Witnesses 26, 27, 29 and 31 claim that their communities, Avie and Sukie Kankhe, are located within the Cofán-Bermejo indigenous reserve, next to the San Miguel River;[193] Witness 31 alleges that both communities are in the same area;[194] Witness 29 adds that his family has lived on the mountain;[195] Witness 29 also states to have attended school in the neighbouring Colombian location of Santa Rosa de los Cofánes,[196] while Witness 31 states that his two-house, nine-person community is located at an hour-and-a-half's walking distance from the Colombian location of San José.[197] The area that meets all those conditions on the banks of the San Miguel river, is the north-eastern part of the Cofán-Bermejo reserve abutting the border with Colombia. That area is the same as that for which lines are depicted in the vicinity of the Cofán reserve, in Figure 2.11 in the *Reply*.

Witness 26 alludes to no specific year or even number of allegedly witnessed sprayings. However, there were only four possibly relevant events between 2000 and 2007, which are shown in Figures 13, 15 and 18.[198] However, all these events were sprayings on Colombian territory, at distances of between 340 and 932 metres, with only a single event in 2002

---

191 EM, Vol. IV, Annex 210.

192 See EM, Vol. IV, Annexes 210, 211, 213 and 215.

193 "I live in the *Avie* Community […] located next to the San Miguel River, in the Cofán-Bermejo Ecological Reserve." (EM, Vol. IV, Annex 210); "I live in the *Avie* community, which is located in the Cofán-Bermejo Ecological Reserve, on the banks of the San Miguel River." (EM, Vol. IV, Annex 211); "[…] community of *Avie,* on the Ecuadorian side of the San Miguel River, where I lived with my parents." (EM, Vol. IV, Annex 213); "[…] *Avie* and *Sukie Kankhe*, the latter one is my community and is the one closest to the San Miguel River." (EM, Vol. IV, Annex 215).

194 "On the border with Colombia, there is an area in which there are four Cofán communities: *Alto Bermejo, Chandia Na'en, Avie* and *Sukie Kankhe*" (EM, Vol. IV, Annex 215).

195 "My father is never going to leave the mountain because we, the Cofán, live with the mountain" (EM, Vol. IV, Annex 213).

196 "I was studying in the school in Santa Rosa de los Cofánes, in Colombian territory, because it was the closest school to the Cofán community of *Avie*" (EM, Vol. IV, Annex 213).

197 "There is another way out toward a small village on the Colombian side called San José; to get there, we have to walk for an hour and a half." (EM, Vol. IV, Annex 215).

198 See also CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, pp. 82-83, 86, 89 and 90, Fig. 11, 12, 14, 16 and 17.

being at a distance of 393 metres. Yet the witness implies that the planes sprayed over her house. The falsehood is evident.

The alleged effects of crops, plants and animals could not have occurred either, even assuming that the wind was blowing towards Ecuador.[199] Hewitt modeled these events and estimated downwind deposition values of 0.700 g/ha, 0.506 g/ha, 0.0833 g/ha and 0.6199 g/ha, respectively.[200] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[201]

This was also confirmed by Dr Evans. After conducting an analysis on satellite images to identify and quantify vegetation changes that occurred within the Cofán area, he concluded that no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found.[202]

But the falsehood does not end there. This witness also follows the usual structure in his statement, evidencing its lack of spontaneity.

- Alleged impacts on human health:
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "My health is affected, I feel sick, I have headaches."
- Loss of crops, and plants turning yellow. "The crops were also affected,"
- Effects on soil and subsequent loss of productivity measured in quintals. "The plants no longer produce as they used to. When I harvested the yucca plant to cook meals, I realized that the yucca was damaged; it is no longer the same. The yucca is normally white inside, but after the sprayings, the yucca seemed as if it were stained inside".
- He/she had never experienced anything similar before. "[A]fter the sprayings, the yucca seemed as if it were stained inside, before the sprayings this was not seen."
- Final dramatic statements. "But this displacement has affected our traditions […] after the families leave the communities, the young people turn away from the traditions. They no longer marry members of the Cofán nationality and they do not

---

199 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

200 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 18, 28, 54 and 23, respectively.

201 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

202 See CR, Vol. II, Annex 6: 3.39-3.51, pp. 39-49; "Consequently, in the Cofán study area, no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found." *Ibid.*, para. 3.69, p. 49.

return to the communities, they remain in the village. This separation has been very difficult for all of us".

Witness 27

(EM, Vol. IV, Annex 211)

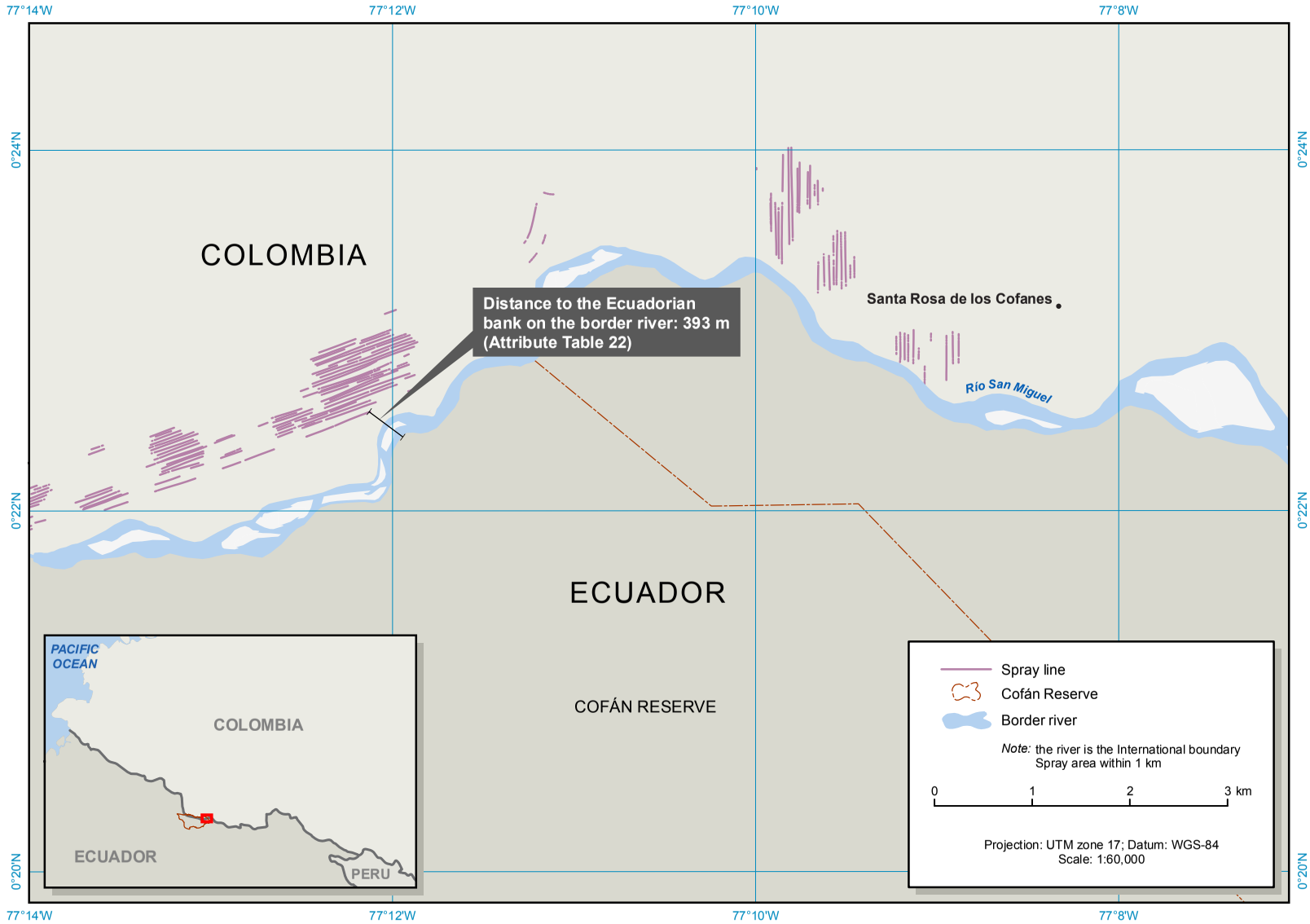


Figure 13. Cofán Bermejo Reserve, Spray Lines in 2002 (Witnesses 26-27-29-31)

Cofán Bermejo Reserve, 2002 (Witness 27)

Metadata of the closest spray lines

METADATO SEGUNDA LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2002 (Witnesses 26-27-29-31)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15196	358	I262A1BC.B99	287-3	Right	64	12:12:06:60	0.37580771	-77.20217690	1392	0,890	0,1	20,9	3,700	142,200	2,600	0	I262A1BC	6,363	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		26 SEPTEMBER 2002				12:12			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
423	362	61

Attribute Table 22

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 393 metres.

Hewitt modeled this event and estimated a deposition value of 0.700 g/ha.[203] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[204] This shows that no damage could have been caused in Ecuador.

[203] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 18.

[204] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

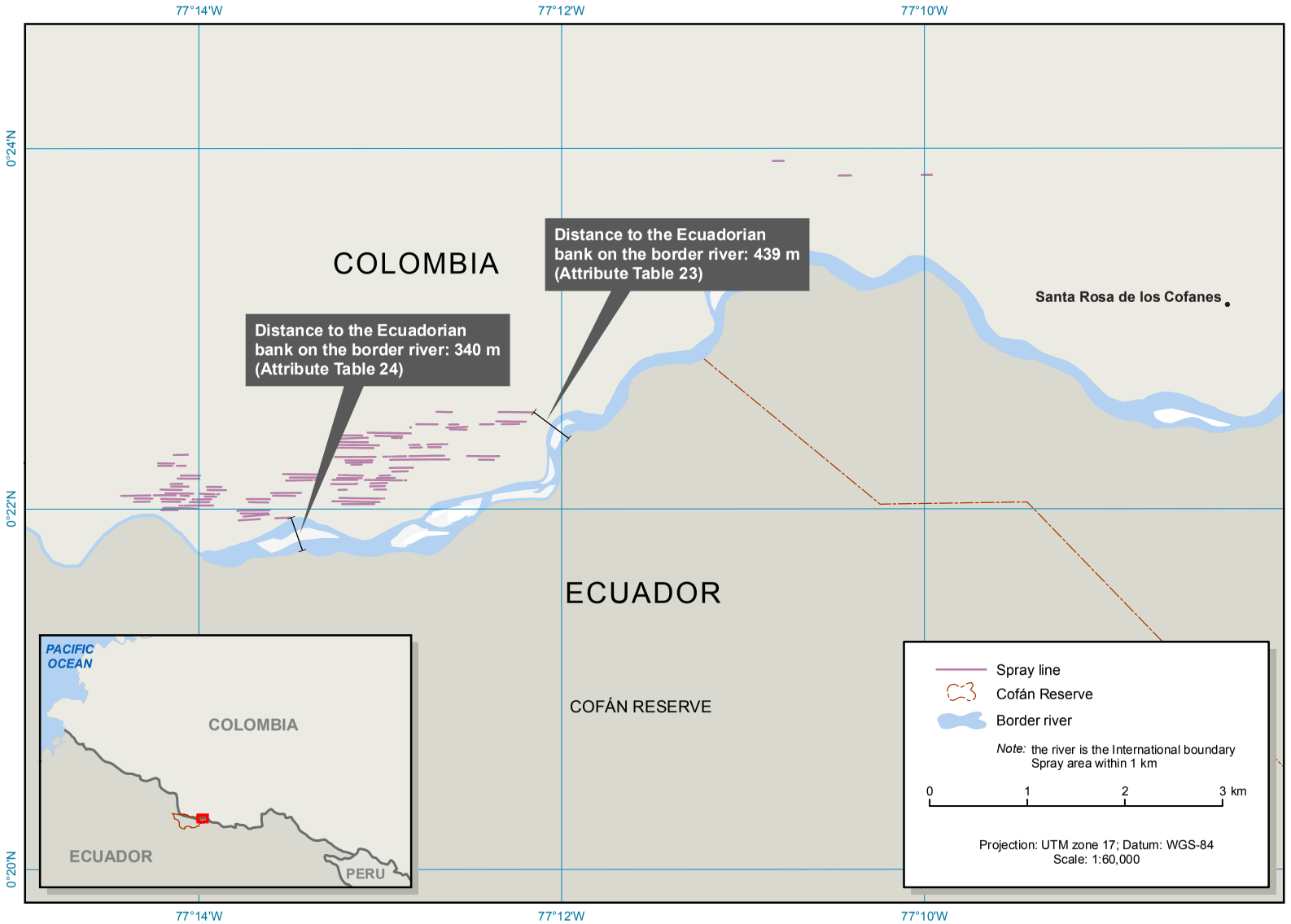


Figure 15. Cofán Bermejo Reserve, Spray Lines in 2004 (Witnesses 26-27-29-31)

Cofan Bermejo, 2004 (Witness 27)

Metadata of the closest spray lines

ATRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																					
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
947	4399	L244A1AC.B01	287-1	Right	51	8:27:20:30	0.37561924	-77.20586656	1322	0,77	4,7	1116,1	4,400	161,900	2,5	2,562	341,92	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 December 2004				08:27			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
403	380	23

Attribute Table 23

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																					
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
817	4264	L244A1AC.B01	287-1	Right	15	7:55:48:70	0.36581905	-77.22639118	1409	0,8	2,1	484,9	53	157,400	2,2	1,113	148,078	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 DECEMBER 2004				07:55			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
429	396	33

Attribute Table 24

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 340 and 439 metres.

Hewitt modeled these events and estimated a deposition values of 0.506 and 0.0833 g/ha.[205] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[206] This shows that no damage could have been caused in Ecuador.

[205] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 28 and 54.

[206] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

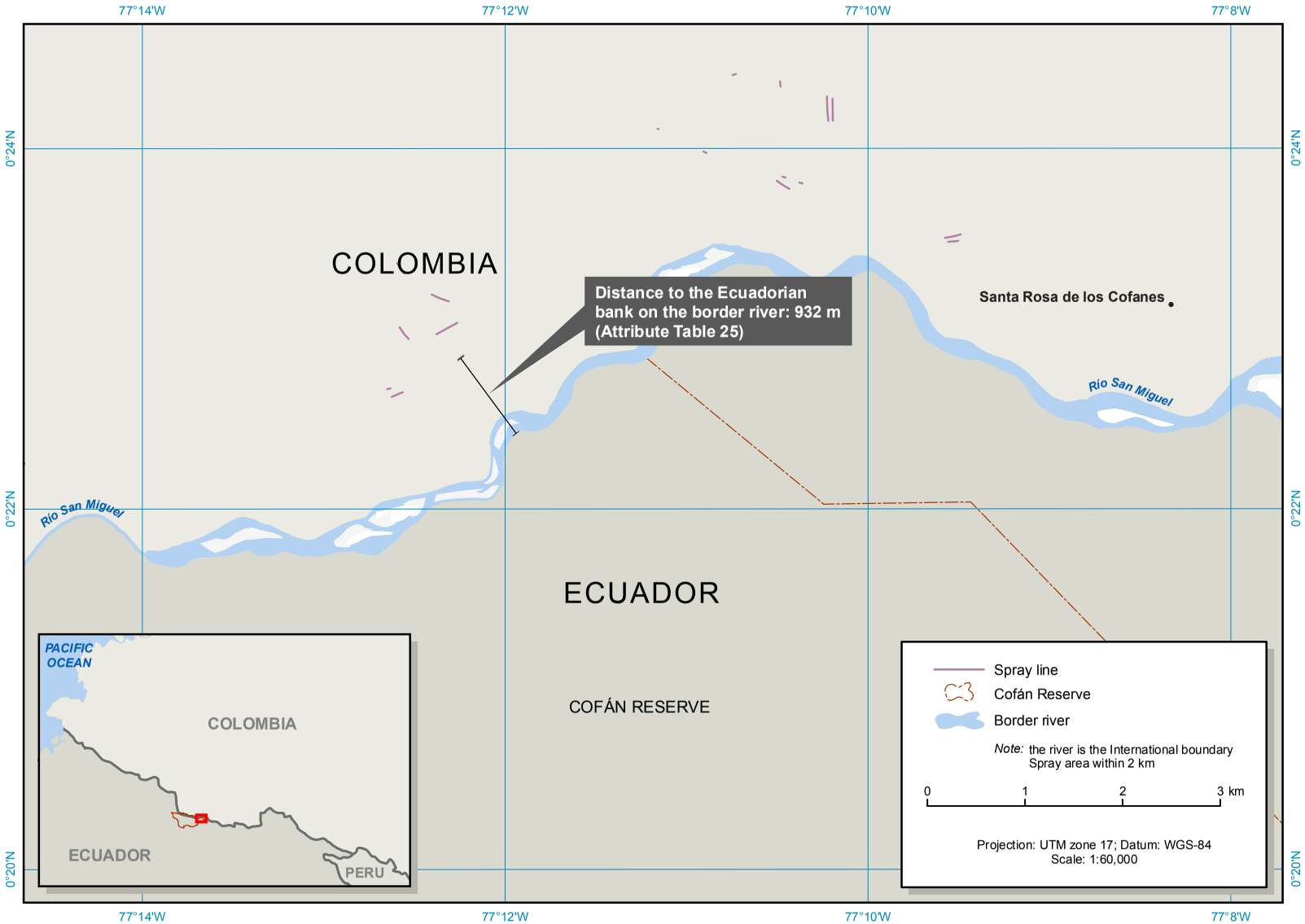


Figure 18. Cofán Bermejo Reserve, Spray Lines in 2007 (Witnesses 26-27-29-31)

Cofan Bermejo, 2007 (Witness 27)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2007 (Witnesses 26-27-29-31)																						
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	GROUP
70	4257	A147&VAC.B99	287-3	- - -	1	21:17:48:99	0.38050949	-77.20436179	416	1,100	0,76	64,023	4195,700	188,400	5,900	0,332	64,048	0701	85	AT802	AT802_Coca	Lobo
PARAMETERS		14 JANUARY 2007				11:17			METERS					MILES/HOUR								

ADDED ATTRIBUTES	
Ground Altitude over MSL (Metres)	Spray Line Altitude over
367	49

Attribute Table 25

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 932 metres.

Hewitt modeled this event and estimated a deposition value of 0.6199 g/ha.[207] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[208] This shows that no damage could have been caused in Ecuador.

[207] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 23.

[208] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 27:

The witness states that he lives "in the Avie community, which is located in the Cofán-Bermejo Ecological Reserve, on the banks of the San Miguel River", just like Witness 26. He claims to remember the first spraying: "We were on the banks of the river, and we saw the planes go by and helicopters escorting them."[209] The witness alludes to no specific year or even number of allegedly witnessed sprayings. However, there were only four possibly relevant events, in the years 2002, 2004 and 2007 which, as shown above in Figures 13, 15 and 18 are the sprayings on Colombian territory that are closest to the witness's location,[198] at distances of between 340 and 932 metres, with only a single event in 2002 being at a distance of 393 metres.[210]

Hewitt modeled these events and estimated downwind deposition values of 0.700 g/ha, 0.506 g/ha, 0.0833 g/ha and 0.6199 g/ha,[211] respectively. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[212] Yet, the witness is particularly dramatic and describes an apocalyptic scene. The falsehood is evident.

This was further corroborated by Dr Evans, who conducted an analysis on satellite images to identify and quantify vegetation changes that occurred within the Cofán area. He concluded that no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found in the study area.[213]

Moreover, the pattern is also evident in the following allegations:

- Alleged impacts on human health:

---

209 EM, Vol. IV, Annex 211.

210 In order to determine the area where the sprayings and their allegedly adverse effects were witnessed, Colombia has taken the following into account: Witnesses 26, 27, 29 and 31 claim that their communities, Avie and Sukie Kankhe, are located within the Cofán-Bermejo indigenous reserve, next to the San Miguel River (see footnote 169); Witness 31 alleges that both communities are in the same area (see footnote 170); Witness 29 adds that his family has lived on the mountain (see footnote 171); Witness 29 also states to have attended school in the neighbouring Colombian location of Santa Rosa de los Cofánes (see footnote 172), while Witness 31 states that his two-house, nine-person community is located at an hour-and-a-half's walking distance from the Colombian location of San José (see footnote 173). The area that meets all those conditions on the banks of the San Miguel river, is the north-eastern part of the Cofán-Bermejo reserve abutting the border with Colombia. That area is the same as that for which lines are depicted in the vicinity of the Cofán reserve, in Figure 2.11 in the *Reply*.

211 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 18, 28, 54 and 23, respectively.

212 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

213 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.39-3.51, pp. 39-49; "Consequently, in the Cofán study area, no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found." *Ibid.*, para. 3.69, p. 49.

  - Serious skin irritation/itching and bumps. “After the spraying, we in the community were afflicted with a snot-like thing in our noses […] and rashes on our arms.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “After the spraying, we in the community were afflicted with […] sore throats, headaches […]”. “Since the sprayings, I have had to go to the Health Center in General Farfán to be treated for throat inflammation caused by drinking water contaminated during the sprayings.”
- Loss of crops, and plants turning yellow. “Also, we used to plant plantain, yucca and maize for food. During the period after the sprayings, the plants turned yellow and the yucca was stained in the inside.” “The medicinal plants have also been lost.”
- Effects on soil and subsequent loss of productivity measured in quintals. “After the sprayings, I noticed a change in the forest. The *ceibos* [tropical trees] that grow by the riverbank do not grow to be very large. The big trees in the jungle have dried up.” “The plantain used to yield four harvests per year; the yucca was harvested at six months and a year. Now, it no longer grows. Our crops do not produce as much as they used to. The yucca is stained on the inside and grows small.”
- Alleged impacts on animals. “The life of the Cofán used to be to hunt or fish when he needed food. We used to hunt deer. To hunt the tapir, seven families would go, because it has a lot of meat. We used to hunt sahino boars, monkeys and dusky-legged guans (birds). Now, there are no animals. The animals that used to live on the banks of the river, such as the *guanta*, no longer come out, their prints are no longer seen, they have hidden farther into the jungle. The tapir no longer comes to the river. The *guanta* does not come out at night either nor the *guatusa* that eats the *guabas*. It is more difficult to get food in the jungle now.” “The few chickens that we had came down with a disease and several of them died.”
- He/she had never experienced anything similar before. “It was the first time that we had seen something like it and it made us very scared”.
- Final dramatic statements. “We have nowhere to go, our land is everything that we have, the reserve has been our home forever.” “Among our traditions, one of the most important is the role of the shaman, known as *“curaga”* [..]. Now, the *curaga* no longer has good visions and has difficulties in contacting the animals to facilitate the hunting. He says that the sprayings have affected the air and the *yagé* does not produce the same effects as before.” “Before, we only used healing plants based on our traditions. Since the sprayings, I have had to go to the Health Center in General Farfán to be treated”.

Witness 28

(EM, Vol. IV, Annex 212)

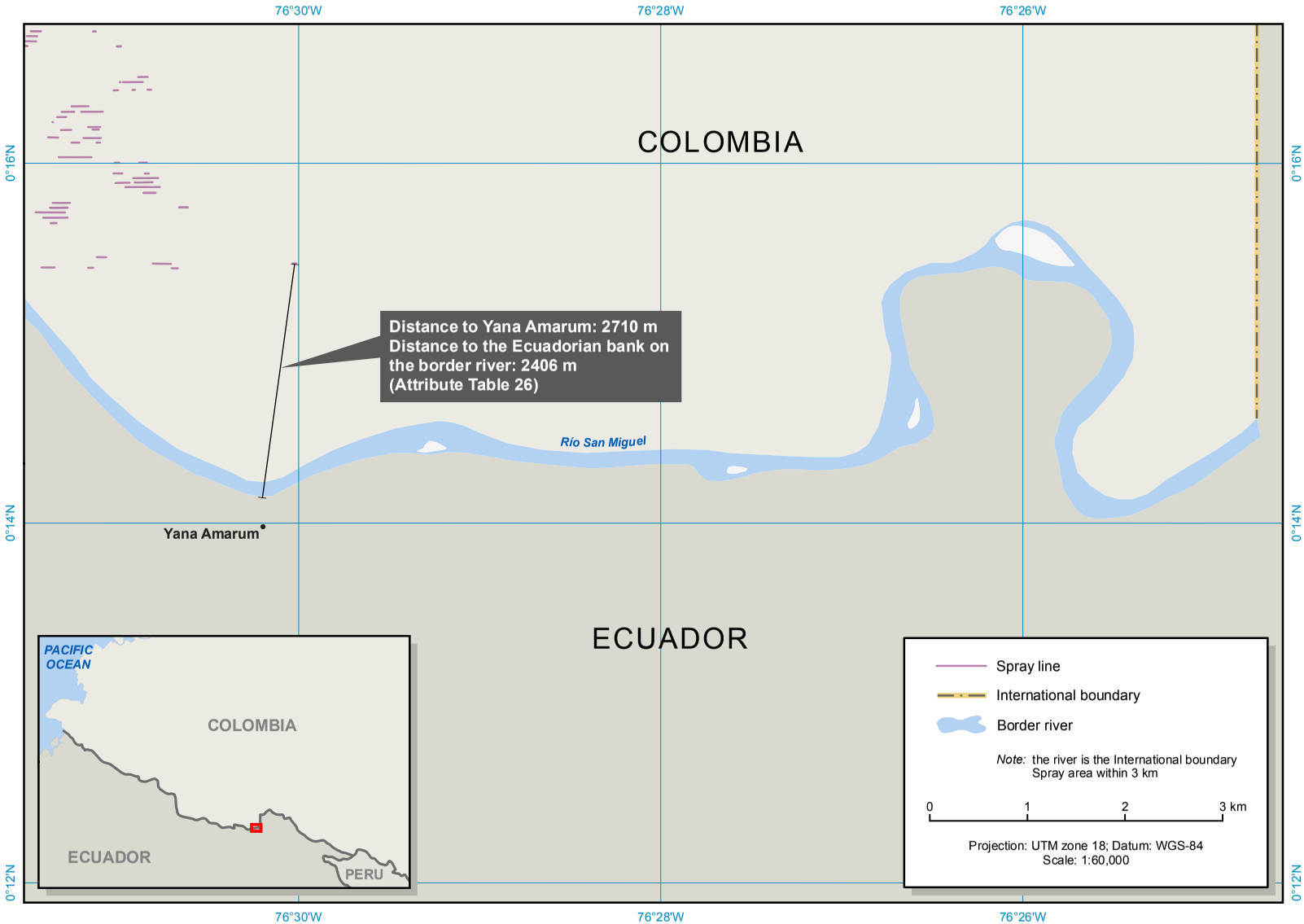


Figure 19. Yana Amarum, Spray Lines in 2002 (Witness 28)

Yana Amarum, 2002 (Witness 28)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA YANA AMARUM 2002 (Witness 28)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
1638	51	J032YSCC.B99	303-1	Right	163	18:06:45:90	0.25738970	-76.50050188	1007	0,890	0,4	118,6	1,800	202,200	2,700	0	J032YSCC	36,163	0210	85	OV-10	Coca	OV-10_Coca
PARAMETERS		03 DE OCTUBRE 2002				13:06			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
306	266	40

Attribute Table 26

YANA AMARUM:

Distance of the closest spray line to Yana Amarum: 2,710 metres, nearly three kilometres. Distance to the Ecuadorian bank on the border river: 2,406 metres, nearly two and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.111 g/ha.[214] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[215] This shows that no damage could have been caused in Ecuador.

[214] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 48

[215] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 28:

The witness states that he lives in the Kichwa community of *Yana Amarum*, which is located on the banks of the San Miguel River, bordering Colombia, in the province of Sucumbíos. He adds that, "[w]hen I saw the planes spraying for the first time, I was working on my farm. We did not know that they were sprayings; we had seen helicopters before but we had never seen those white planes or the white cloud that they brought. They came from Colombia, up to the San Miguel River; they would cross to the Ecuadorian side and turn around. I saw the smoke coming out of the planes and reaching our community."[216]

The only spraying on Colombian territory between 2000 and 2007 in the relevant area, was in 2002, i.e., the event shown in Figure 19, at a distance of over 2.4 kilometres from the Ecuadorian bank on the border river, and yet the witness claims that he saw the smoke coming out of the planes and reaching his community. The falsehood is evident.

Moreover, even the alleged effects on crops, plants and animals could not have occurred. Dr Hewitt modeled the even shown in Figure 19 and estimated a downwind deposition value of 0.111 g/ha at 2.4 kilometres.[217] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[218] Therefore, even if the wind was blowing toward Ecuador,[219] no damage could have been caused.

This was also confirmed by Dr Evans, who conducted an analysis on satellite images to identify and quantify vegetation changes that occurred within the Cofán area. He concluded that no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found in the study area.[220]

Finally, the lack of spontaneity is also evident in this statement:

- Alleged impacts on human health:

---

216 EM, Vol. IV, Annex 212.

217 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 48

218 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

219 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

220 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, paras. 3.39-3.51, pp. 39-49; "Consequently, in the Cofán study area, no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found." *Ibid.*, para. 3.69, p. 49.

  - Serious skin irritation/itching and bumps. “A few days after the planes flew by, my wife, who had been outside working during the sprayings, became sick with bumps on her legs, which turned into white spots that she still has to this day.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea.
- Loss of crops, and plants turning yellow. “About two days after that spraying, the plants started to wither; they dried up day after day, as if they had no water.”
- Effects on soil and subsequent loss of productivity measured in quintals. “Before we used to plant the stem of the yucca and it would sprout; but after the sprayings, we would plant it and the plant would not grow, the stem seemed to be poisoned, it would dry up in the ground.” “The same thing happened with the maize.” “I have always earned a living by selling the crops that we grew and the land produced, but now the land no longer produces as it used to”.
- Alleged impacts on animals. “Since we no longer had any crops to sell, we tried to sell our chickens and pigs, but people would not buy them because they looked sick. All the smaller pigs died. The effects were also observed in some of the wildlife.”
- He/she had never experienced anything similar before. “We did not understand why this was happening – we had never seen anything like it before”. “Following the sprayings, those who lived off hunting no longer found the animals they used to hunt, such as the *cerillo* (a mountain pig), monkeys, armadillos, and *guantas*. I used to fish everyday; and, one day after the first spraying, I went fishing, as always, but what I found were dead fish in the estuary, floating in the water whitish and swollen. I saw that the fish were no longer safe to eat and I returned home empty handed.”
- Dramatic statements. “Before the sprayings, life was normal and happy. […]Everyone had enough to eat and to make a bit of money. But a few years ago, the first sprayings came.” “The effect on the yucca was particularly difficult for us; the yucca is our central food, which is eaten everyday. Furthermore, it is used to make *chicha*, a traditional beverage that the Kichwa people have always drunk.” “Finally, in 2004, I had to leave the community to work in the city of Puerto Nuevo, because after the sprayings, there was nothing to harvest in *Yana Amarum*, and life had become too hard.” “[I]n my community we only live off the crops, that is why the sprayings affect us so much in the country. I was not the only one to leave. Of eighteen families, four left in search of a better life, farther from the border and their problems”.

Witness 29

(EM, Vol. IV, Annex 213)

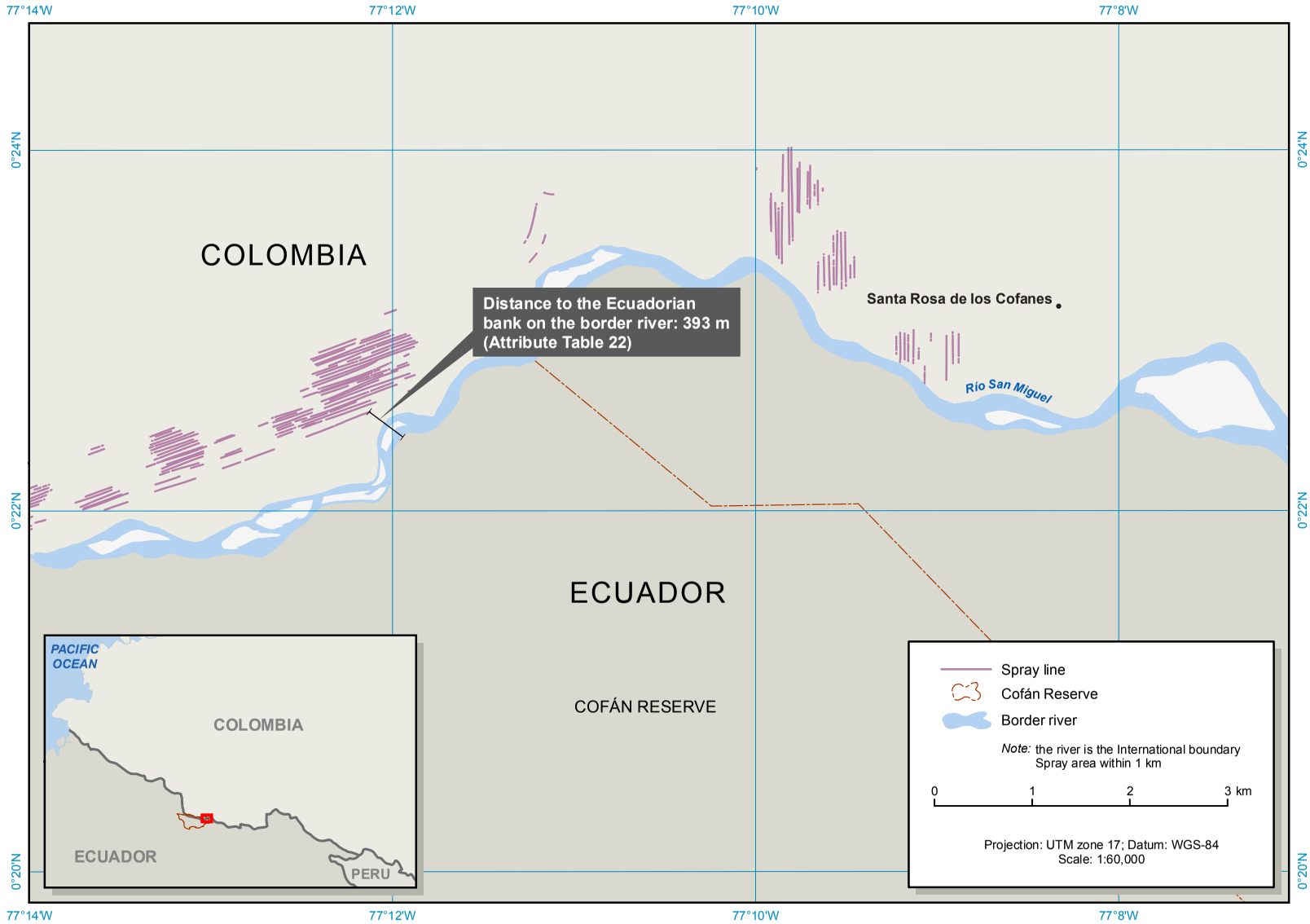


Figure 13. Cofán Bermejo Reserve, Spray Lines in 2002 (Witnesses 26-27-29-31)

Cofán Bermejo Reserve, 2002 (Witness 29)

Metadata of the closest spray lines

METADATO SEGUNDA LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2002 (Witnesses 26-27-29-31)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15196	358	I262A1BC.B99	287-3	Right	64	12:12:06:60	0.37580771	-77.20217690	1392	0,890	0,1	20,9	3,700	142,200	2,600	0	I262A1BC	6,363	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		26 SEPTEMBER 2002				12:12			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
423	362	61

Attribute Table 22

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 393 metres.

Hewitt modeled this event and estimated a deposition value of 0.700 g/ha.[221] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[222] This shows that no damage could have been caused in Ecuador.

[221] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 18.

[222] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

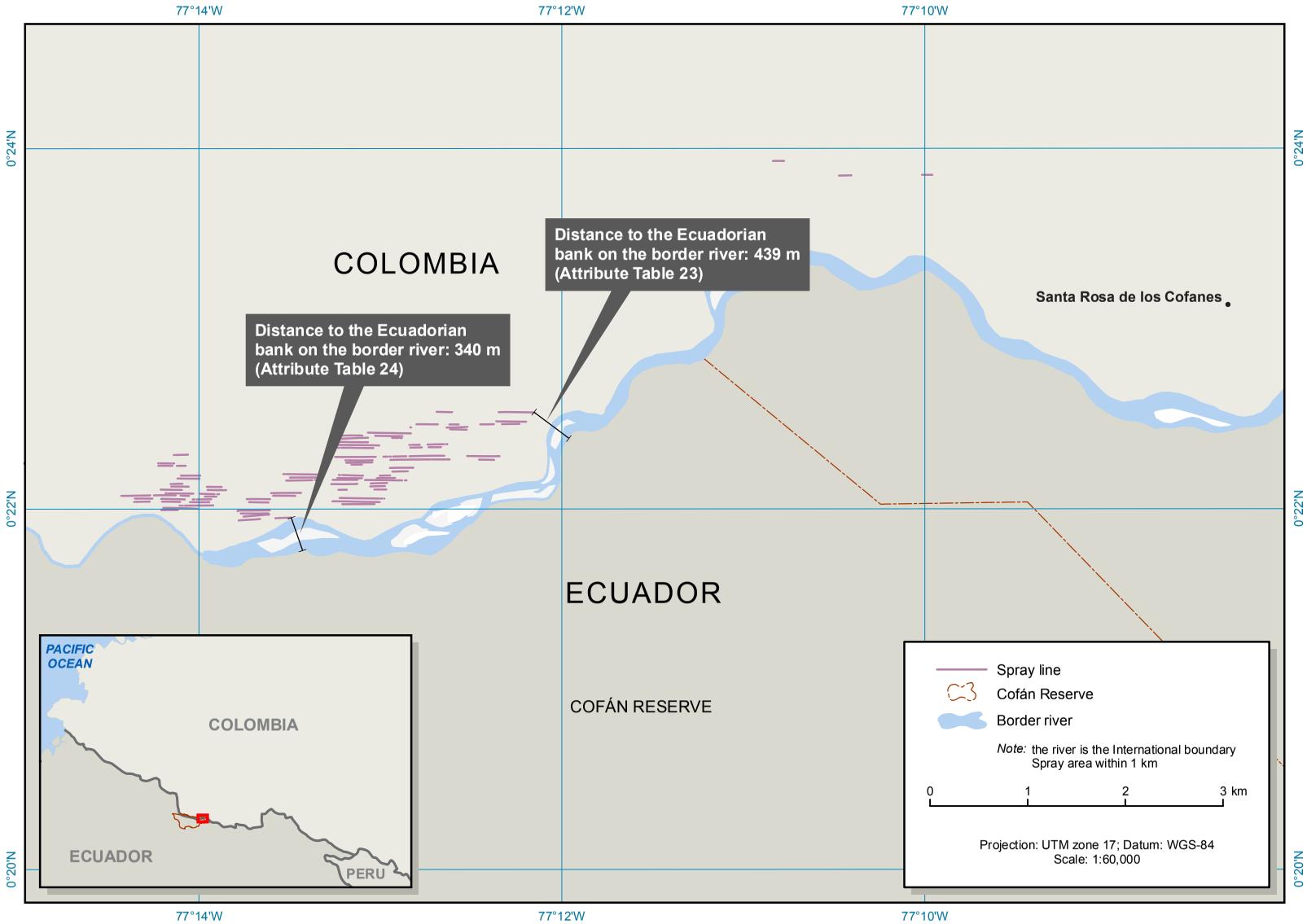


Figure 15. Cofán Bermejo Reserve, Spray Lines in 2004 (Witnesses 26-27-29-31)

Cofan Bermejo, 2004 (Witness 29)

Metadata of the closest spray lines

ATRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
947	4399	L244A1AC.B01	287-1	Right	51	8:27:20:30	0.37561924	-77.20586656	1322	0,77	4,7	1116,1	4,400	161,900	2,5	2,562	341,92	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 December 2004				08:27			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
403	380	23

Attribute Table 23

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
817	4264	L244A1AC.B01	287-1	Right	15	7:55:48:70	0.36581905	-77.22639118	1409	0,8	2,1	484,9	53	157,400	2,2	1,113	148,078	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 DECEMBER 2004				07:55			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
429	396	33

Attribute Table 24

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 340 and 439 metres.

Hewitt modeled these events and estimated deposition values of 0.506 g/ha and 0.0833 g/ha, respectively.[223] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[224] This shows that no damage could have been caused in Ecuador.

[223] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 28 and 54.

[224] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

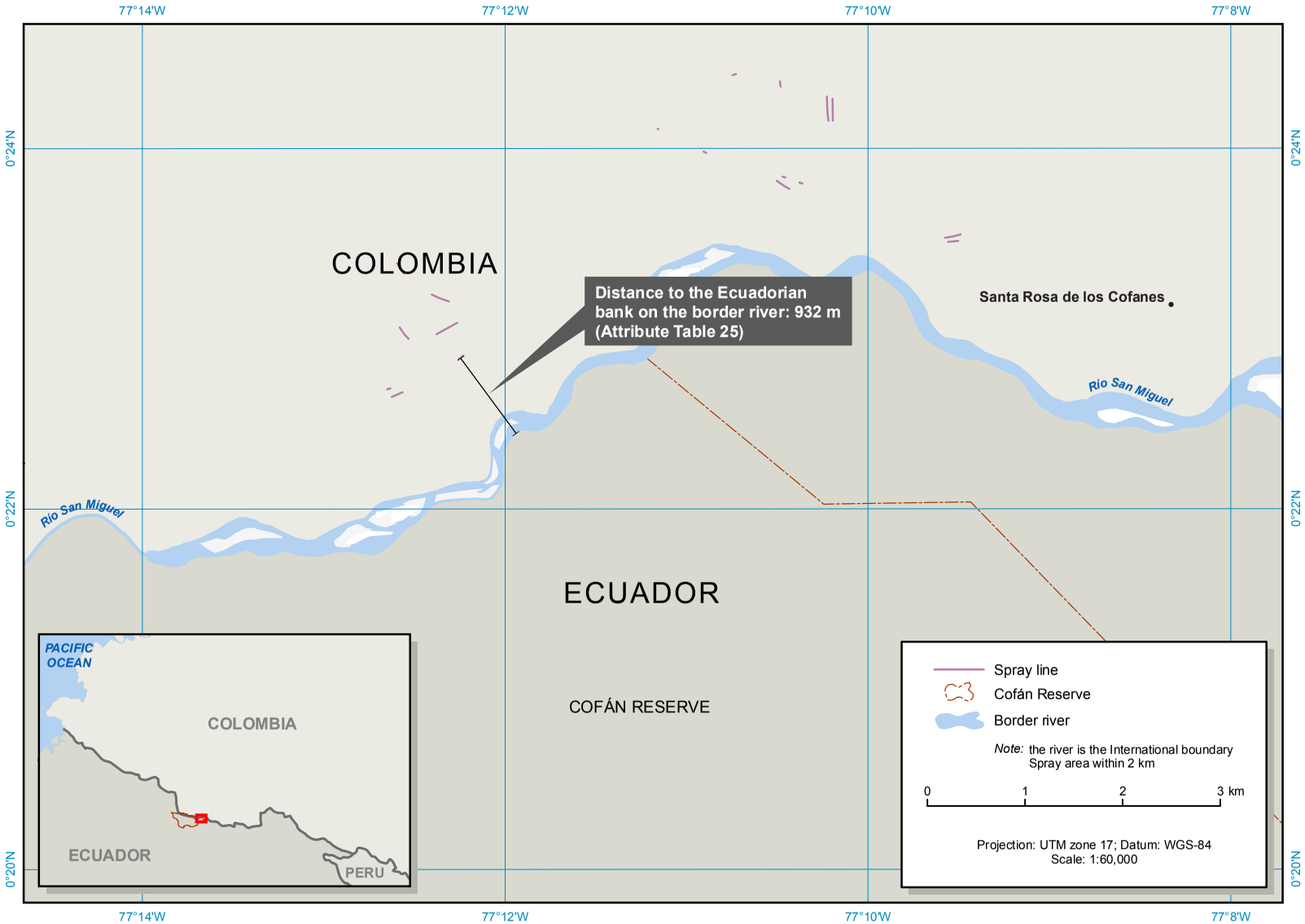


Figure 18. Cofán Bermejo Reserve, Spray Lines in 2007 (Witnesses 26-27-29-31)

Cofan Bermejo, 2007 (Witness 29)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2007 (Witnesses 26-27-29-31)																					
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	GROUP
70	4257	A147&VAC.B99	287-3	---	1	21:17:48:99	0.38050949	-77.20436179	416	1,100	0,76	64,023	4195,700	188,400	5,900	0,332	64,048	0701	85	AT802	AT802_Coca	Lobo
PARAMETERS		14 JANUARY 2007				11:17			METERS					MILES/HOUR								

ADDED ATTRIBUTES	
Ground Altitude over MSL (Metres)	Spray Line Altitude over
367	49

Attribute Table 25

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 932 metres.

Hewitt modeled this event and estimated a deposition value of 0.6199 g/ha.[225] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[226] This shows that no damage could have been caused in Ecuador.

[225] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 23.

[226] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 29:

The witness states that he "was about ten years old when [he] experienced the first spraying. At that time, [he] was studying in the school in Santa Rosa de los Cofánes, in Colombian territory, because it was the closest school to the Cofán community of Avie, on the Ecuadorian side of the San Miguel River, where [he] lived with [his] parents." He also indicates that he lives in the mountain: "My father is never going to leave the mountain because we, the Cofán, live with the mountain." Then he claimed: "When the first spraying occurred, we were in school and we saw several planes come by". Additionally, without specifying any time-frame the witness stated that: "Once, when we were by the riverbank, we saw the planes coming with their white smoke from the Colombian side, and they turned around over Ecuador and returned."[227]

The witness alludes to no specific year or even number of allegedly witnessed sprayings. However, the witness acknowledges to have resided in Quito for five years prior to August 2008, i.e., since 2003. Therefore, the only relevant year would be 2002, for which the event shown in Figure 13 is the spraying on Colombian territory that is closest to the witness's location,[228] at a distance of 393 metres from the Ecuadorian bank on the border river.[210] Quite obviously, the river was not sprayed, nor was the Ecuadorian territory, as shown by the spray data furnished to Ecuador by the United States' Department of State. The falsehood is evident.

Even though this time the witness does not claim that plants and crops turned yellow after the spraying, and what he says about animals could not happen even under direct spraying, in the interest of completeness Dr Hewitt modeled the event shown in Figure 13 and estimated a downwind deposition value of 0.700 g/ha,[229] at 393 metres from the application site. The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[230] Assuming wind direction toward Ecuador,[231] still no damage could have been caused.

Furthermore, Dr Evans confirmed this after conducting an analysis on satellite images to identify and quantify vegetation changes that occurred within the Cofán area. He concluded

---

227 EM, Vol. IV, Annex 213.

228 See also CR, Vol. II, Annex 18: Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, Analysis of Certain Spraying Operational Aspects, October 2011, pp. 82 and 83, Fig. 11 and 12.

229 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 18.

230 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

231 This is not usually the case. See See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

that no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found in the study area.[232]

Finally, the way the witness follows the usual structure of all the statements is worth noting:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Within a week of the sprayings, I developed bumps […], which lasted some two or three weeks".
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "Within a week of the sprayings, I developed […] a fever, headache, vomiting, and dizziness, which lasted some two or three weeks."
- Effects on soil and subsequent loss of productivity. "Before, they used to work with the plantain, yucca and maize. Now, I see that they no longer work because the plants do not produce."
- Alleged impacts on animals. "There are not as many animals as there used to be in the jungle near the river. I saw the change after spending so much time in Quito."
- He/she had never experienced anything similar before. "I was treated with medicinal plants, although their powers were not as they had been before."
- Dramatic statements. "The customs of my people have changed. Work has changed." "My grandfather no longer drinks *yagé,* as he used to, because he says that the plant no longer works and the visions no longer come. It seems that his power and *curaga* spirit have been weakened a lot because he can no longer perform his rituals to know how to guide and protect the people".

[232] See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.39-3.51, pp. 39-49; "Consequently, in the Cofán study area, no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found." *Ibid.*, para. 3.69, p. 49.

Witness 30

(EM, Vol. IV, Annex 214)

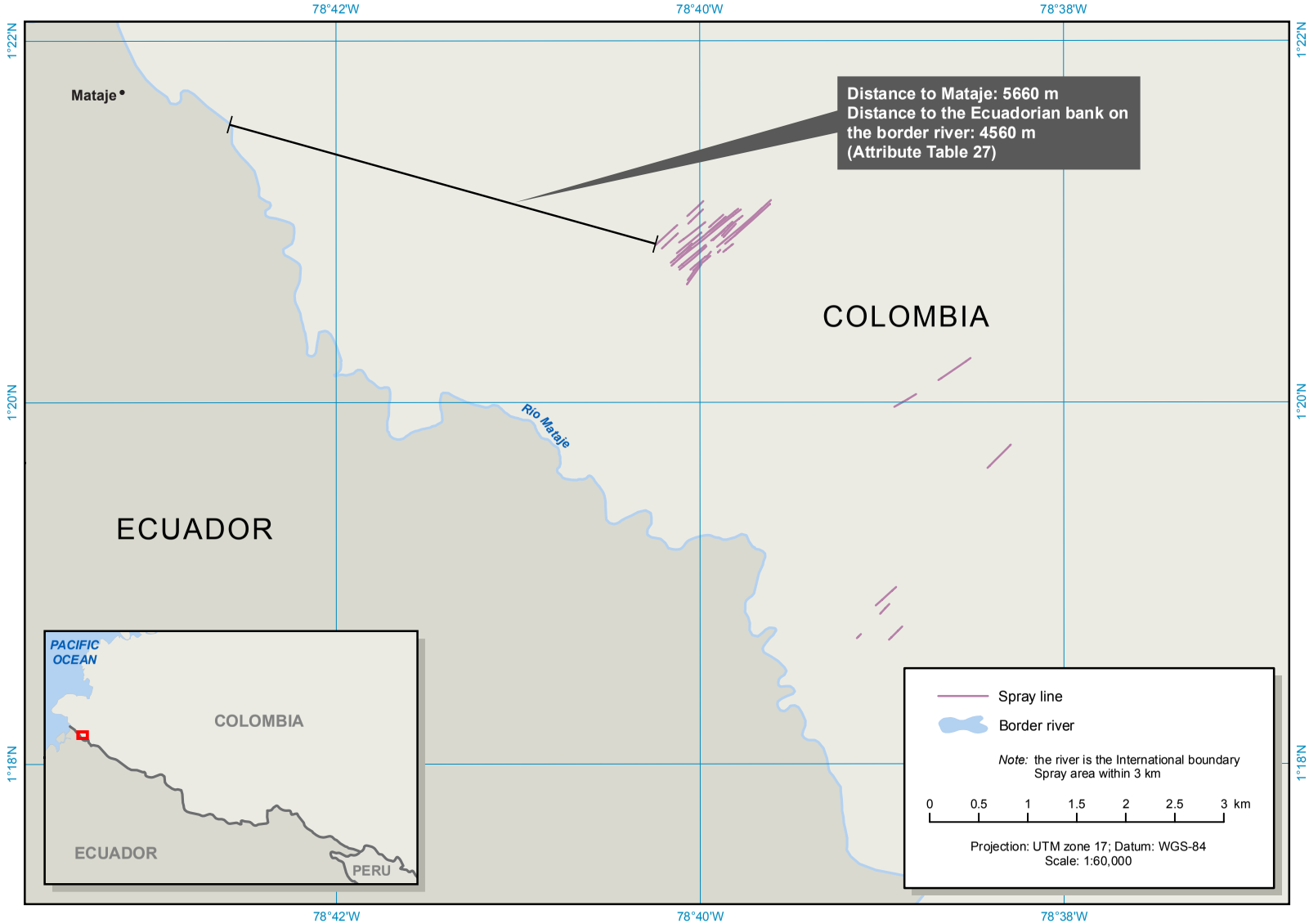


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 30)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[233] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[234] This shows that no damage could have been caused in Ecuador.

[233] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[234] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 30:

The witness states that he has lived in Mataje, Province of Esmeraldas, for 34 years, and about seventy meters from the Mataje River, which borders Colombia. He claims to "have endured" the sprayings three times and describes the alleged effects caused by "the first time it occurred", in the year 2000. "I was working on my farm, clearing the land with a machete. *The planes were flying very close to the river, dropping a liquid* that drifted with the wind toward us."[235]

As shown in Figure 20, the spray events close to Mataje in 2000 were carried out on Colombian territory, at a distance of over 4.5 kilometres from the Ecuadorian bank on the border river, and yet the witness claims that the planes were "flying very close to the river, dropping a liquid." The falsehood is evident.

Moreover, Dr Hewitt modeled the event shown in Figure 20 and estimated a downwind deposition value of 0.192 g/ha at a distance of 4.5 from the application site.[236] As the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops,[237] none of the alleged effects on crops, plants and animals could have happened.

This witness also follows a structure quite resembling a script:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "[A]s I was clearing the land, my skin touched the plants. I immediately felt my skin itch. Within a few days, I had bumps on my skin. The bumps burned. My wife's hands were affected and they itched."
- Loss of crops, and plants turning yellow. "After the sprayings, my crops were affected. Eight days after the sprayings, the leaves on the cacao tree started falling off, until not a single leaf was left; the tree dried up completely and it died. The same thing happened with the yucca. Within three days, the leaves fell off the yucca and even the root rotted; the root smelled. The *guineo* also dried up, the leaves were drying up and withering. The plants turned yellow. After a few weeks, everything was dead. All the plants were dead on the ground."
- Effects on soil and subsequent loss of productivity measured in quintals.

---

235 EM, Vol. IV, Annex 214 [Emphasis added].

236 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

237 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

- Alleged impacts on animals. “I had some animals, including some pigs and chickens. The liquid fell on the animal feed. The chickens eat maize. The pig eats *guineo* and *chileno*, but these plants were contaminated. I had a hectare of plants, to feed the animals, but all the plants were ruined, I no longer had any feed for the animals. The plants were finished and the animals were finished.”
- Final dramatic statements. “I had to move, to replant in a new place. But this second planting was affected by the second spraying. It was the same thing. After the third spraying, I moved farther inland and planted again. Now, my crops are growing better. With God’s help, now I have two hectares, growing food for my children and pigs.”

Witness 31

(EM, Vol. IV, Annex 215)

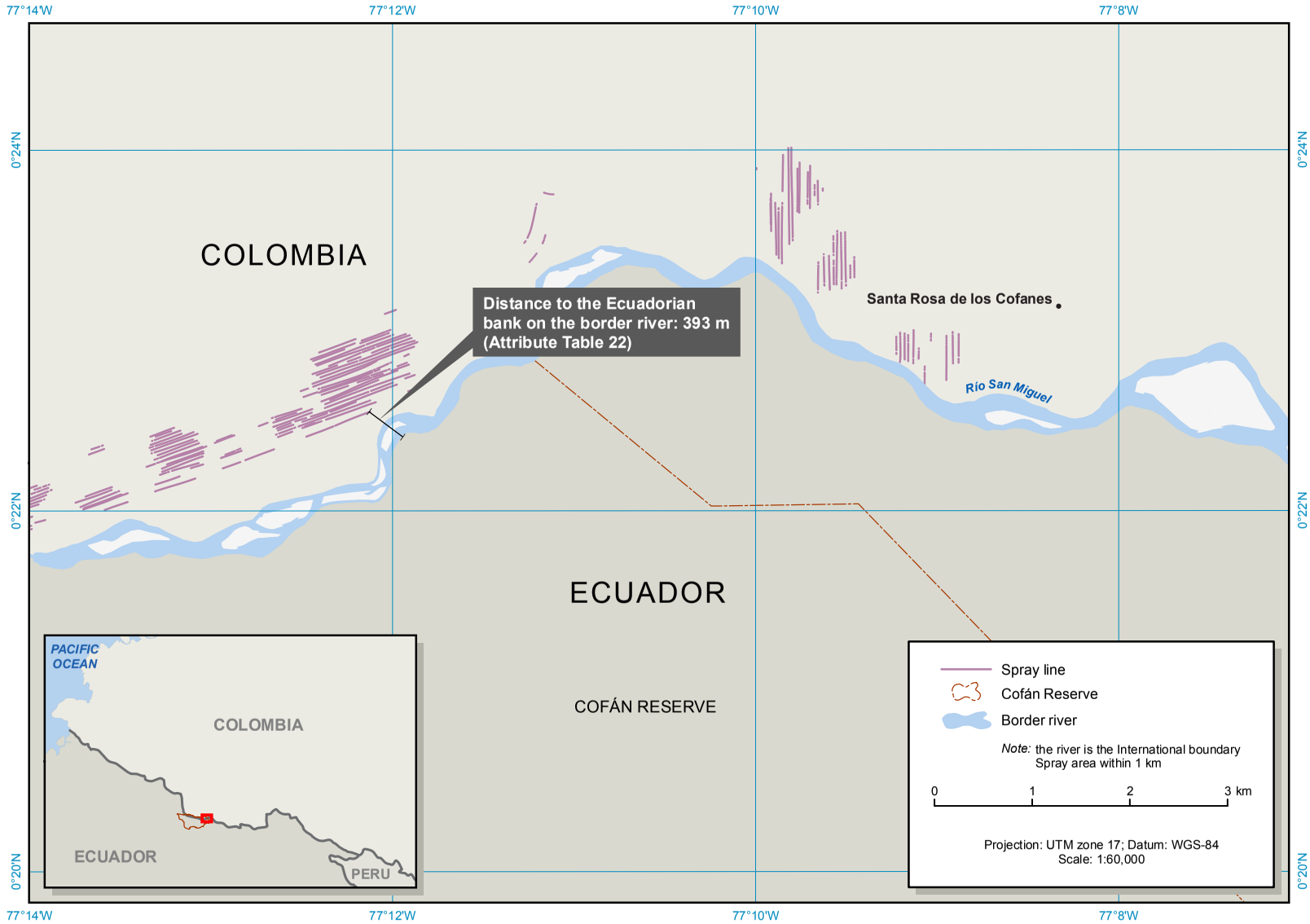


Figure 13. Cofán Bermejo Reserve, Spray Lines in 2002 (Witnesses 26-27-29-31)

Cofán Bermejo Reserve, 2002 (Witness 31)

Metadata of the closest spray lines

METADATO SEGUNDA LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2002 (Witnesses 26-27-29-31)																							
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
15196	358	I262A1BC.B99	287-3	Right	64	12:12:06:60	0.37580771	-77.20217690	1392	0,890	0,1	20,9	3,700	142,200	2,600	0	I262A1BC	6,363	0209	50	T-65	Coca	T-65_Coca
PARAMETERS		26 SEPTEMBER 2002				12:12			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
423	362	61

Attribute Table 22

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 393 metres.

Hewitt modeled this event and estimated a deposition value of 0.700 g/ha.[238] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[239] This shows that no damage could have been caused in Ecuador.

[238] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 18.

[239] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

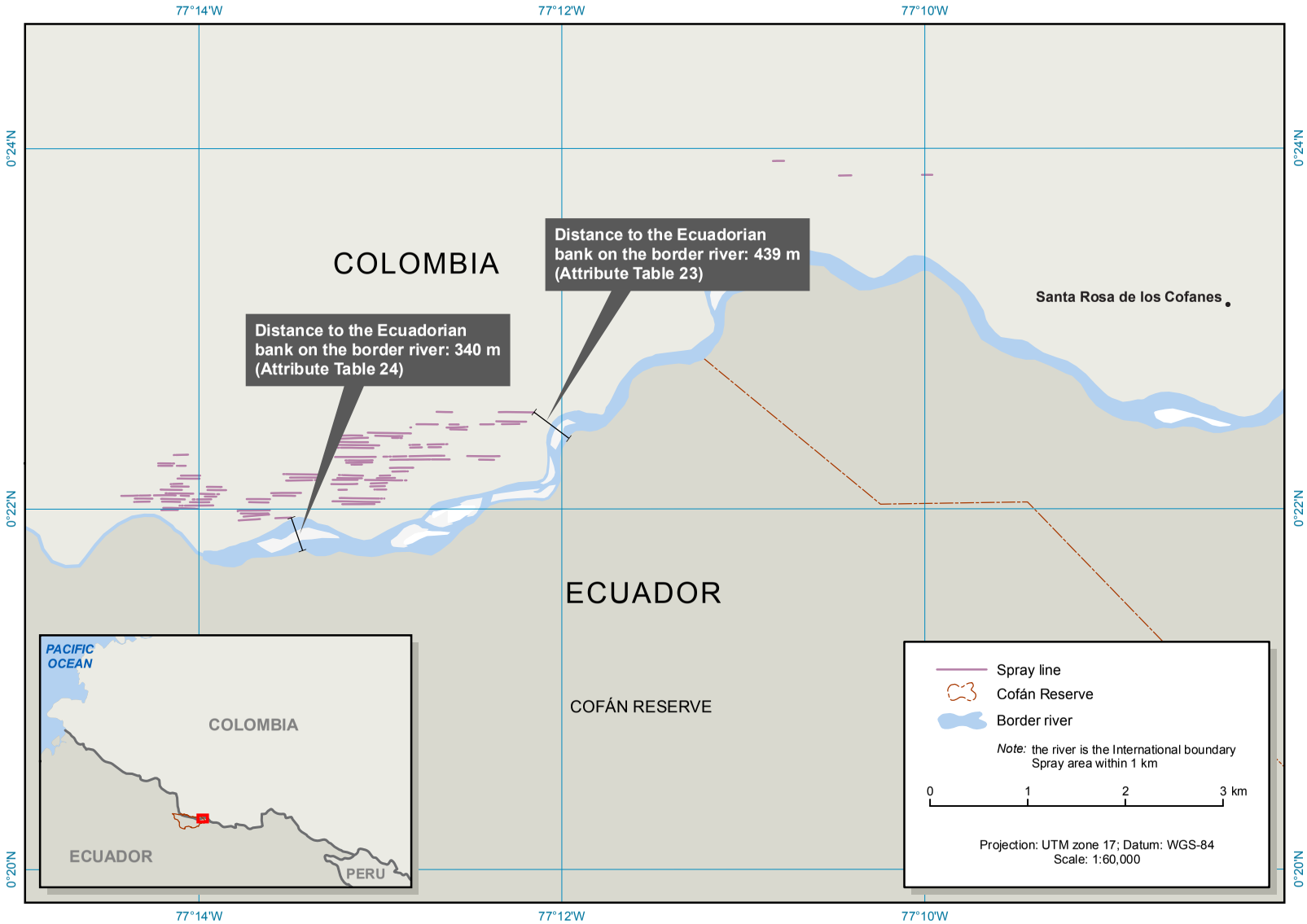


Figure 15. Cofán Bermejo Reserve, Spray Lines in 2004 (Witnesses 26-27-29-31)

Cofan Bermejo, 2004 (Witness 31)

Metadata of the closest spray lines

ATRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
947	4399	L244A1AC.B01	287-1	Right	51	8:27:20:30	0.37561924	-77.20586656	1322	0,77	4,7	1116,1	4,400	161,900	2,5	2,562	341,92	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 December 2004				08:27			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
403	380	23

Attribute Table 23

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO COFAN BERMEJO IN 2004 (Witnesses 26-27-29-31)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	CROP
817	4264	L244A1AC.B01	287-1	Right	15	7:55:48:70	0.36581905	-77.22639118	1409	0,8	2,1	484,9	53	157,400	2,2	1,113	148,078	0412	50	T-65	T-65_Coca	Coca
PARAMETERS		24 DECEMBER 2004				07:55			FEET					MILES/HOUR								

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
429	396	33

Attribute Table 24

COFÁN BERMEJO RESERVE:

Distance of the closest spray lines to the Ecuadorian bank on the border river: 439 and 340 metres.

Hewitt modeled these events and estimated deposition values of 0.506 g/ha and 0.0833 g/ha, respectively.[240] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[241] This shows that no damage could have been caused in Ecuador.

[240] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 28 and 54.

[241] See CR, Vol. II,, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

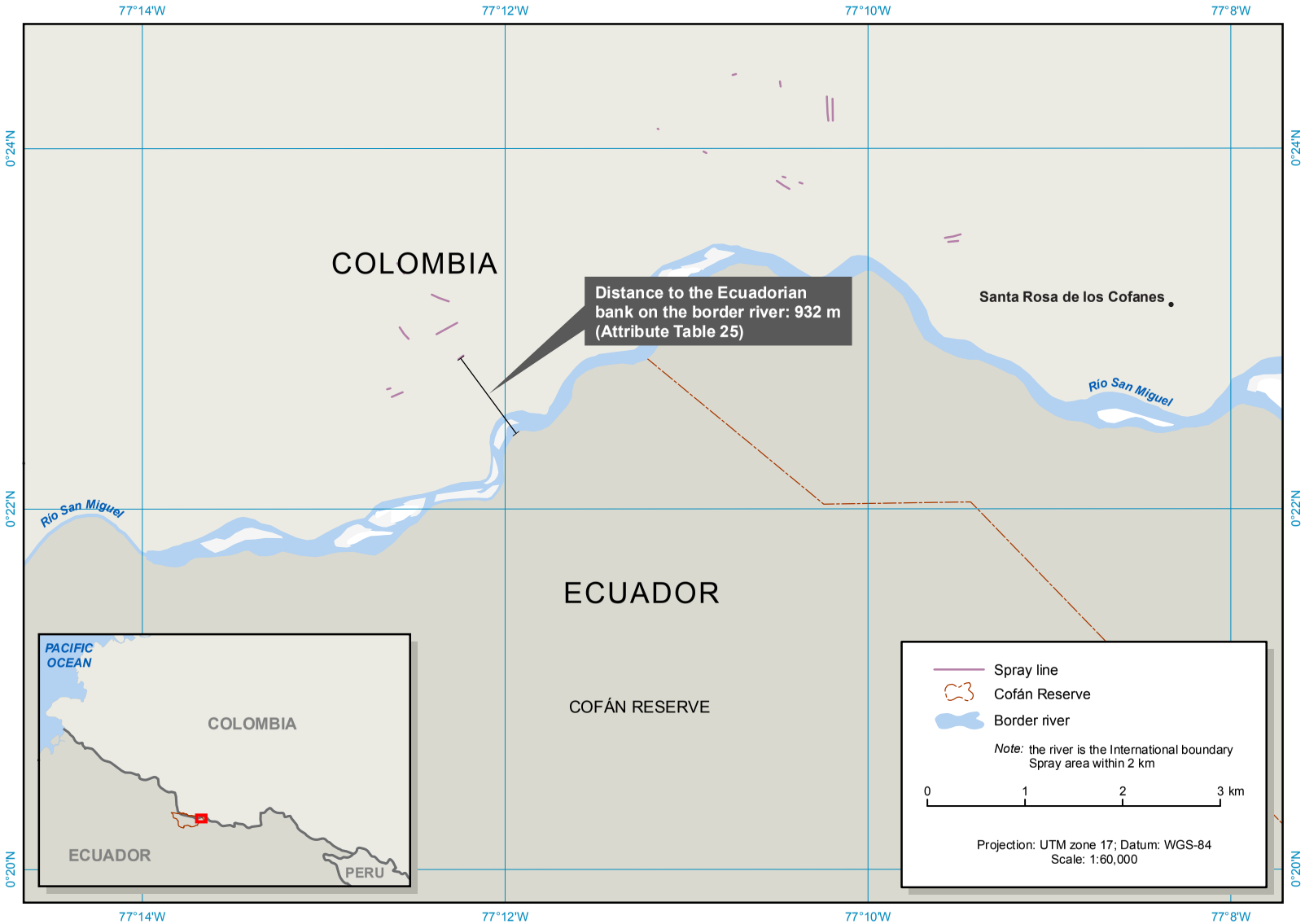


Figure 18. Cofán Bermejo Reserve, Spray Lines in 2007 (Witnesses 26-27-29-31)

Cofan Bermejo, 2007 (Witness 31)

Metadata of the closest spray lines

METADATO LINEA DE ASPERSION MAS CERCANA COFAN BERMEJO 2007 (Witnesses 26-27-29-31)																					
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LENGTH	MONTH	SWATH	AIRCRAFT	AC_CROP	GROUP
70	4257	A147&VAC.B99	287-3	---	1	21:17:48:99	0.38050949	-77.20436179	416	1,100	0,76	64,023	4195,700	188,400	5,900	0,332	64,048	0701	85	AT802	AT802_Coca	Lobo
PARAMETERS		14 JANUARY 2007				11:17			METERS					MILES/HOUR								

ADDED ATTRIBUTES	
Ground Altitude over MSL (Metres)	Spray Line Altitude over
367	49

Attribute Table 25

COFÁN BERMEJO RESERVE:

Distance of the closest spray line to the Ecuadorian bank on the border river: 932 metres.

Hewitt modeled this event and estimated a deposition value of 0.6199 g/ha.[242] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[243] This shows that no damage could have been caused in Ecuador.

[242] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 23.

[243] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 31:

The witness states that he lives in the community of Sukie Kankhe, "the closest to the San Miguel River", "on the banks of the San Miguel River", in an area were there are three other Cofán communities, one of them Avie. He claims that his community is within an hour-and-a-half's walking distance from the San José location in Colombia. He states that there are two houses in his community of 9 persons, including himself, his wife and his four children, where he acts as shaman. He claims that they have "endured" the sprayings three times. The first time that he saw the sprayings he was in his house: "The planes crossed the river and *flew over our community releasing that white smoke*. They flew over my house, I saw them." Then he adds: "That smoke from the planes fell on my house and also on my body". The effects allegedly started immediately.[244]

There were only four possibly relevant events, in the years 2002, 2004 and 2007 which, as shown in Figures 13, 15 and 18 are the sprayings –all of them on Colombian territory– that are closest to the witness's location,[198] at distances of between 340 and 932 metres, with only a single event in 2002 being at a distance of 393 metres.[210] Yet the witness claims that the planes crossed the river and sprayed over his house. The falsehood in this statement is absolutely evident.

Hewitt modeled the closest events and estimated downwind deposition values of 0.700 g/ha, 0.506 g/ha, 0.0833 g/ha and 0.6199 g/ha,[245] respectively. All of those values are insignificant, considering that the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[246] This shows that none of the alleged effects on plants, crops and animals could have been caused in Ecuador, even ignoring the general wind trends in the area.[247]

This was also confirmed by Dr Evans, who conducted an analysis on satellite images to identify and quantify vegetation changes that occurred within the Cofán area. He concluded that no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found in the study area.[248]

The witness'sscript is also evident:

---

244 EM, Vol. IV, Annex 215.

245 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 18, 28, 54 and 23.

246 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

247 See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

248 See CR, Vol. II, Annex 6: Dr B.M. Evans, Ph.D., *Expert Report by Dr Barry M. Evans*, Dec. 2011, 3.39-3.51, pp. 39-49; "Consequently, in the Cofán study area, no evidence of defoliation caused by aerial herbicide spraying during August and September of 2002 could be found." *Ibid.*, para. 3.69, p. 49.

- Alleged impacts on human health: “At that moment, I felt as if my skin was going numb, I felt my throat become dry and I got a cough. The effect was immediate and it happened to most of my family.”
  - Serious skin irritation/itching and bumps. “My wife and children were also in the community when it happened, the smoke also fell on their bodies and later they had some terrible bumps, even on their heads, but mostly on the thorax. Everyone developed the bumps, but they affected the children the most. The problem with the bumps was not just the result of what fell on our bodies, but also of what was left contaminated. For example, we wash our clothing in the river and later we hang it to dry in the sun, which leaves it exposed. It was there when the smoke also fell on the clothes and that continued to affect our skin. That lasted for about two weeks, first we had small bumps and then a week later they burst. The bumps itched a lot.”
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “In addition, the children developed stomachaches, vomiting and diarrhea. That started about two days after the sprayings and lasted for two days; the children could not eat or drink anything.”
- Loss of crops, and plants turning yellow. “The sprayings also affected the plants. In the community, we had planted maize, yucca, plantain, and papaya. The planes with their smoke destroyed everything, the crops, the woodland, the jungle. The effects on the plants were noticed after two days when they starting changing color, and three days later they looked dry. After a few days of spraying, with the wind and the rain, the leaves in the virgin jungle started to fall off and one could see the change, because before everything was green, and after the sprayings one could see the leaves falling off and the dry branches.” “[A]fter the sprayings, the plants that are near our community and the river are now useless.” “I used to have a hectare sown with *yaje* and that was also destroyed a few days after the first spraying.”
- Effects on soil and subsequent loss of productivity measured in quintals. “After the sprayings, the earth no longer produced as it used to; it was left sick. I have planted again and now that some time has passed in which the planes have not sprayed, the crops are starting to produce.”
- Alleged impacts on animals. “The animals were also affected. After the sprayings, we saw dead animals. When the birds ate the fruits contaminated by the sprayings, such as the plantain, they would get sick. The chickens that I had would vomit everything they ate, shake and then die, now I do not have many chickens. We also saw many of the jungle birds become stiff and fall dead to the ground, we saw this about four days after the spraying. Once, after the spraying, we hunted a *guanta* and we could see that its hair had fallen off. Before, we used to go fishing, but now we

hardly fish, because there are now almost no fish in the river, as if something came and destroyed them."

- Final dramatic statements. "[W]e, the Cofán, respect nature, we do not think of destroying it, because looking after nature is looking after ourselves. But the sprayings came without us being able to avoid them, it was something that we were not familiar with and against which we could not defend ourselves; they affected the jungle and with it our lives and our traditions."

Witness 32

(EM, Vol. IV, Annex 216)

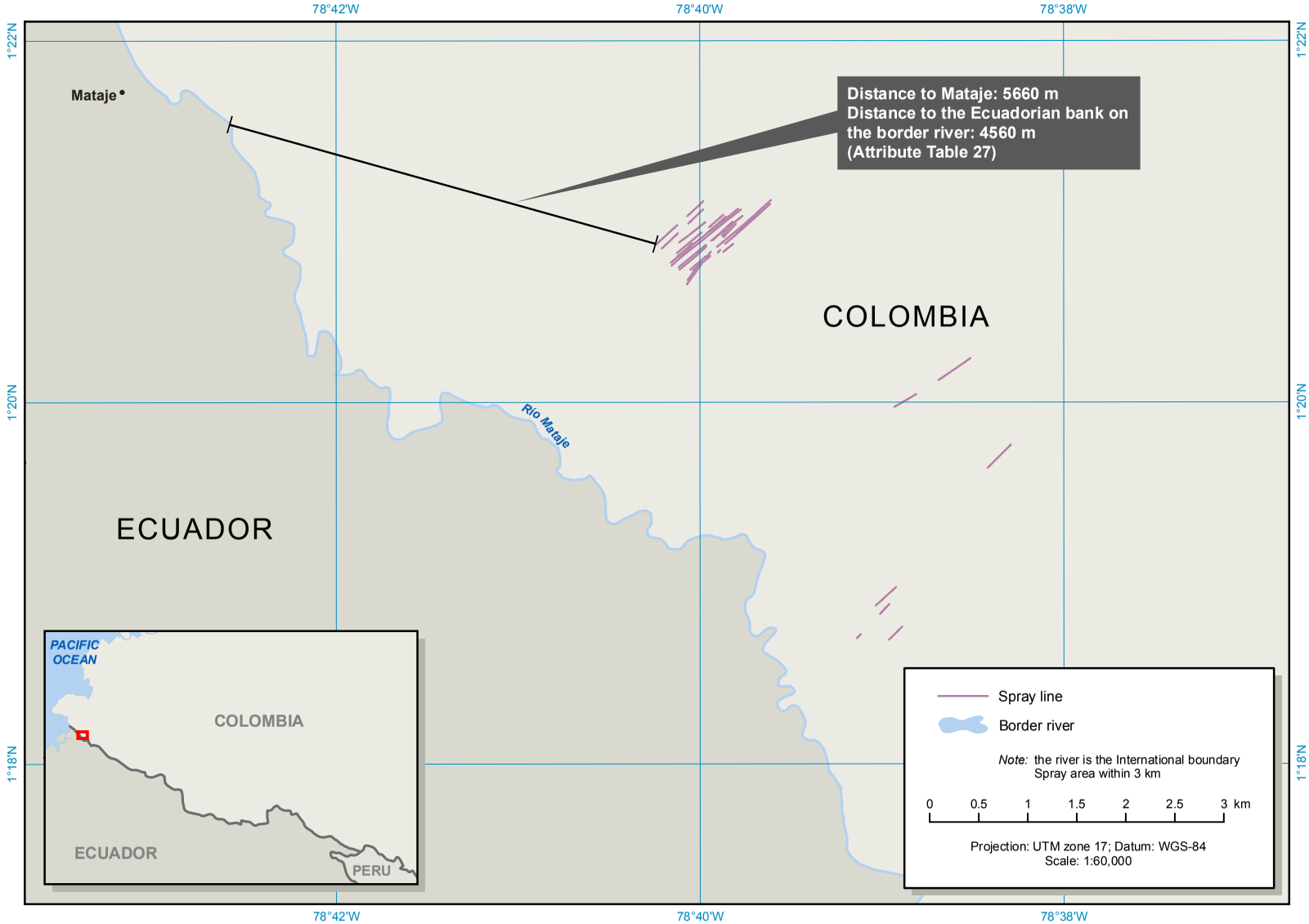


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 32)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[249] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[250] This shows that no damage could have been caused in Ecuador.

[249] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[250] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

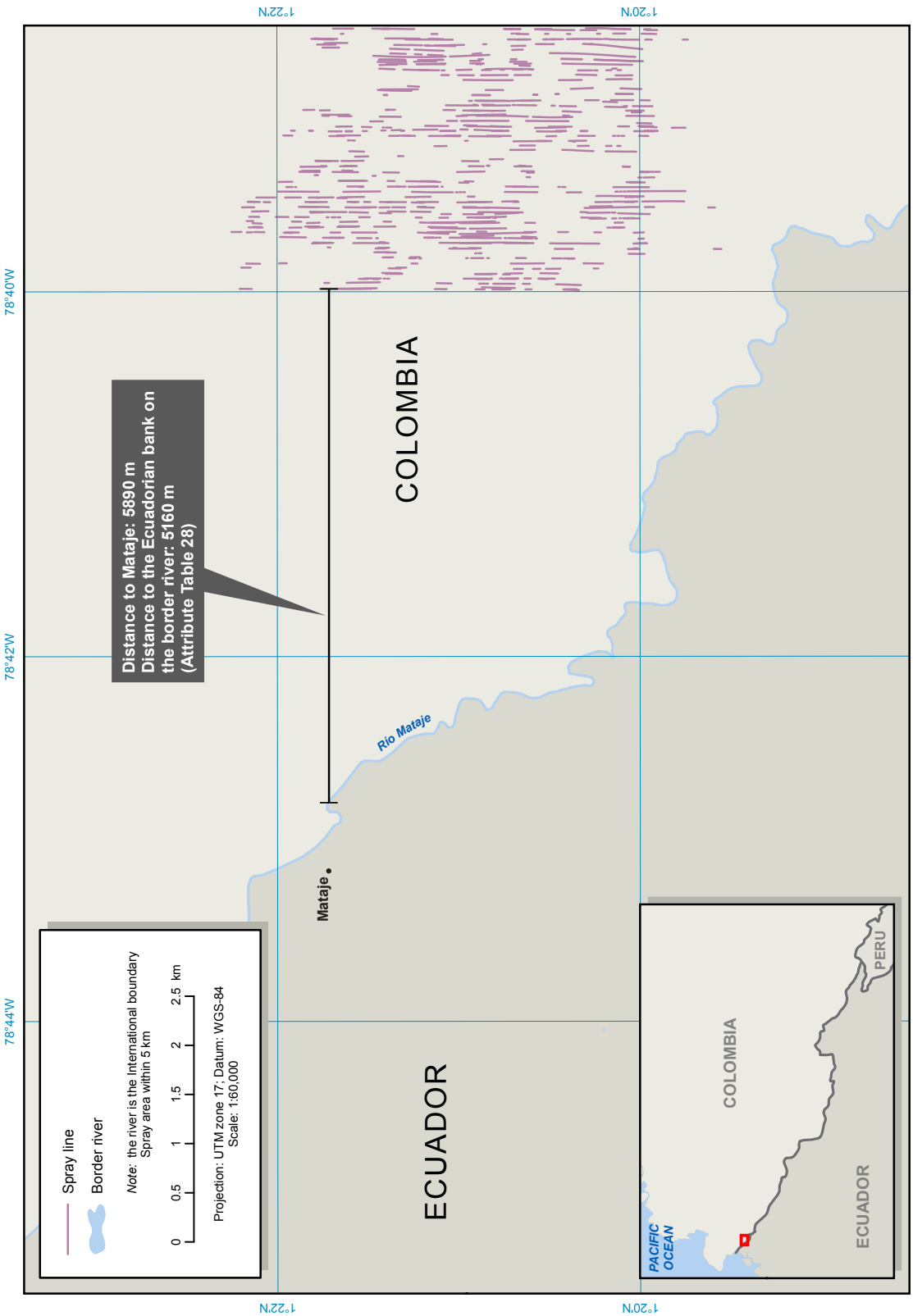


Figure 21. Mataje, Spray Lines in 2002 (Witness 32)

Mataje, 2002 (Witness 32)

Metadata of the closest spray line

METADATO LINEA DE ASPERSION MAS CERCANA MATAJE 2002 (Witness 32)																						
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
2905	240	B202U$CC.B99	93-3	---	1	18:46:34:68	1.36273717	-78.66644455	391	0	5,3	1639,6	19,100	208,900	2,5	0	B202U$CC	500,347	0202	85	OV-10	Coca	OV-10_Coca
PARAMETERS		20 DE FEBRERO 2002				13:46			METERS					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
119	87	32

Attribute Table 28

MATAJE:

Distance to Mataje: 5,890 metres, nearly six kilometres.
Distance to the Ecuadorian bank on the border river: 5,160 metres, over five kilometres.

Hewitt modeled this event and estimated a deposition value of 0.0339 g/ha.[251] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[252] This shows that no damage could have been caused in Ecuador.

[251] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 66.

[252] See CR, Vol. II,, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

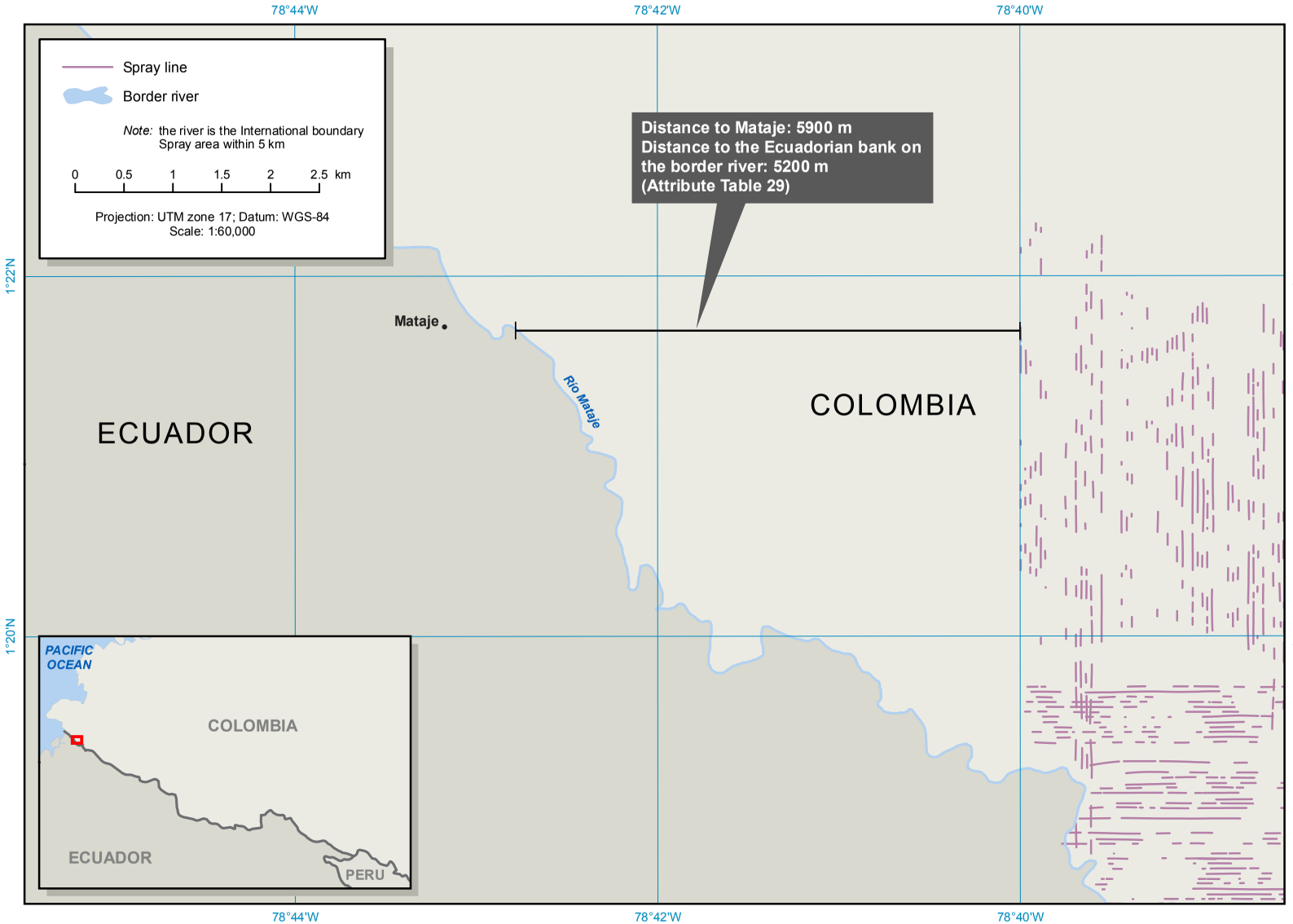


Figure 22. Mataje, Spray Lines in 2003 (Witness 32)

Mataje, 2003 (Witness 32)

Metadata of the closest spray line

METADATO LINEA DE ASPERSION MAS CERCANA MATAJE 2003 (Witness 32)																								
OBJECTID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
16457	928	A20325BC.B99	93-1	---	1	15:06:19:15	1.36189819	-78.66664757	409	0,890	1,85	453,2	1,400	167,000	2,600	0,549	A20325BC	138,853	0301	85	AT802	Coca	AT802_Coca
PARAMETERS		20 DE ENERO 2003				15:06			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
124	89	35

Attribute Table 29

MATAJE:
Distance to Mataje: 5,900 metres, nearly six kilometers.
Distance to the Ecuadorian bank on the border river: 5,200 metres, over five kilometers.

Hewitt modeled this event and estimated a deposition value of 0.0372 g/ha.[253] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[254] This shows that no damage could have been caused in Ecuador.

[253] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 65.

[254] See CR, Vol. II,, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 32:

The witness states that he lives in Mataje, about thirty meters from the Mataje River, but his farm is a little further inland, about five-city blocks away. He remembers the spraying in three occasions: the first time was in 2000, the second was a few years later, and he thinks that the third one was in 2004. However, he claims that the second spraying is the one that allegedly affected him most: "The planes were releasing a whitish mist and, since I was in the canoe and the planes were flying near me that mist fell on my body." [255]

The events shown in Figure 20 were sprayings on Colombian territory, near the witness's location, in 2000. They were carried out at a distance of over 4.5 kilometres from the Ecuadorian bank on the border river, and over 5.6 kilometres from the location of Mataje.

Given that the witness claims the "second spraying" was the one that affected him the most, and that it took place "a few years later", the relevant spray events in 2002 and 2003 are also analysed. As shown in Figure 21, in 2002 the event closest to the witness's location was a spraying on Colombian territory, at a distance of over 5 kilometres from the Ecuadorian bank on the border river. In 2003, the event shown in Figure 22 was the closest spraying, at a distance of over 5.2 kilometres from the Ecuadorian bank on the border river. Yet the witness claims that he "saw the planes coming from Colombia, *they were flying over my head, following the river*", "*the planes were flying near me, that mist fell on my body*". The falsehood is evident.

Furthermore, at the distances involved none of the alleged effects on plants, crops and animals could have been caused, even ignoring the general wind trends in the area.[256] Hewitt modeled these events and estimated downwind deposition values of 0.192 g/ha, 0.0339 g/ha and 0.0372 g/ha at the Ecuadorian bank of the border river.[257] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[258] This shows that no damage could have been caused in Ecuador.

Finally, it is quite evident that the Witness No. 32 also follows the usual script:

- Alleged impacts on human health:

---

[255] EM, Vol. IV, Annex 216 [Emphasis added].

[256] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

[257] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 42, 66 and 65.

[258] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

  - Serious skin irritation/itching and bumps. “The following day we were still sick and, we also woke up with bumps on our bodies”.
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. “About three hours after dinner, everyone in the house was sick with stomachache, vomiting and diarrhea.”
- Loss of crops, and plants turning yellow. “All my crops were ruined, they turned yellow and little by little they dried up, after the spraying. First, the leaves were affected; they would wither and dry up until they fell off the plant. The plant also dried up until it finally died.”
- Effects on soil and subsequent loss of productivity measured in quintals. “After everything had dried up, we tried planting again, but the plants did not produce, they grew a little, to a very small height, and instead of growing more they would die without producing.”
- Alleged impacts on animals. “The following day I went to get shrimp because I saw that they were dying on the banks of the river. When I arrived at the river, the shrimp were dying on dry land.” “Aside from the shrimp, other animals were also affected. The ones that suffered the most were the pigs. After the sprayings, they got sick, they seemed sad and they would not eat anything, they got thin and, in the end, some of them starved to death.” “My dog, named Laisa, got sick. She was vomiting and would not eat, and fifteen days later she died.”
- Final dramatic statements. “I have always lived off farming but after the sprayings, I could no longer do it, that is why I was forced to move to the new town of Mataje in search for a job and opportunities to survive, just like many other families in town. The new town was established after the sprayings, it was formed for and by families that wanted to flee from the banks of the river, the planes, the poison being dropped, and from all the deaths that this has caused. Now there are nineteen houses in the new town, all of them full of people who came, trying to escape from the sprayings.”

Witness 33

(EM, Vol. IV, Annex 217)

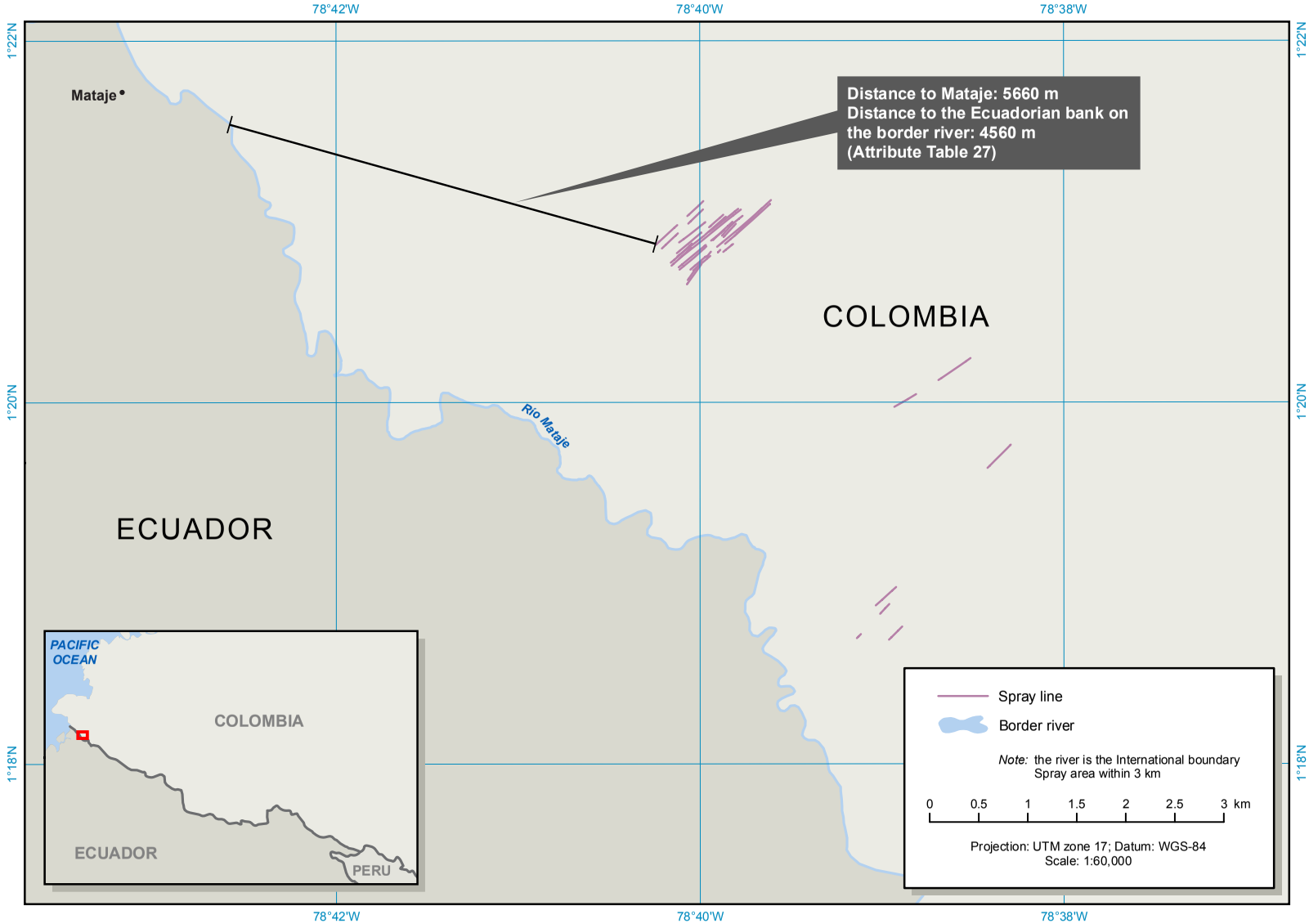


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 33)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[259] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[260] This shows that no damage could have been caused in Ecuador.

[259] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[260] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 33:

The witness states that he has lived all his life in Mataje, Esmeraldas Province, in a house that is about a kilometer from the Mataje River, which borders Colombia. He refers to the first time that the planes came by spraying from Colombia, in the year 2000. "I remember that the first time that the planes came by spraying from Colombia was in the year *two thousand*. I was working in the field, which is right next to the river. I saw some white planes, escorted by some helicopters**,** *spraying along the border*."[261] The alleged effects began three days later.

The events shown in Figure 20 were sprayings on Colombian territory in 2000, at a distance of over 2 kilometres, in the case of the spray event closest to the border in that general area; and another, at over 4.5 kilometres from Ecuadorian bank on the border river projected towards Mataje. Yet, the witness claims that he "saw some white planes, escorted by some helicopters**,** *spraying along the border*." The falsehood is evident.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[262] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[263] This shows that no damage could have been caused in Ecuador.

Anyway, the witness statement contains the usual elements as follows:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Nevertheless, about three days after the spraying, I had bumps all over my body. They itched a lot. The bumps lasted for about two months."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "I also had vomiting and diarrhea, which lasted for about five days." "A lot of the children had diarrhea and vomiting, including the children in my family. The adults were also sick but the children were affected more."
- Loss of crops, and plants turning yellow. "Shortly after the spraying, the pasture grass died. There were no plants left on our farm, everything was dead and dry as a desert. About a week after the spraying, the plantain, yucca and cacao had rotted. The lemon and guava fruits fell to ground and rotted."

---

261 EM, Vol. IV, Annex 217 [Emphasis added].

262 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

263 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

- Alleged impacts on animals. “The animals that we had on the farm, the chickens and dogs, either died or became sick and thin. I also noticed that on the same day that they sprayed over us, the shrimp and fish died, and they were dying in the river.”
- He/she had never experienced anything similar before. “I had never seen anything like it before.”
- Final dramatic statements. “The entire community lost their crops; my family and I went to work near Orellana in order to buy food. There were two other times that they came by to spray and the same effects occurred. I hope they do not return again.”

Witness 34

(EM, Vol. IV, Annex 218)

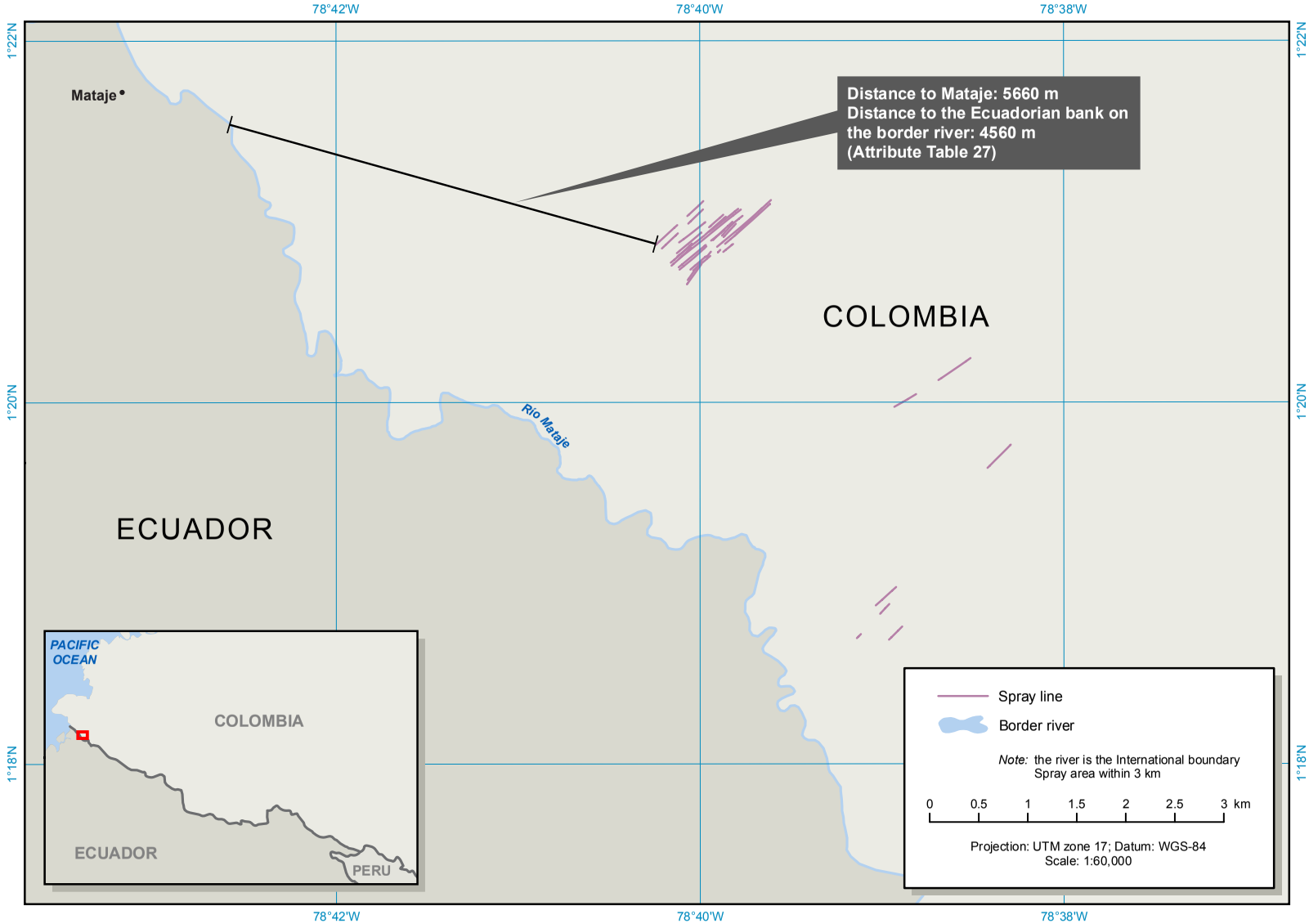


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 34)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[264] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[265] This shows that no damage could have been caused in Ecuador.

[264] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[265] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 34:

The witness states that he "was in Mataje when the first spraying occurred in the *year 2000.* During that time, I was living in a house, in Mataje, *right on the banks of the Mataje River,* like the majority of the houses in the community. You could see the river from the house, it was only a few meters away." He claims that he was working in the field, cleaning the land, when he saw *several planes above* that came and "dropped a liquid" that fell on him, on his head, arms, and all over his body. Immediately, he allegedly felt his skin itch intensely, and his face became swollen and disfigured.[266]

One of the events shown in Figure 20 was a spraying on Colombian territory, at a distance of over 4.5 kilometres from the Ecuadorian bank on the border river, and yet the witness claims that "*[he] saw several planes above*" and that the liquid fell on him, on his head, arms, and all over his body. The falsehood is evident.

The witness further alleges loss of plants, crops and animals. However, Hewitt modeled the closest event and estimated a downwind deposition value of 0.192 g/ha.[267] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[268] This shows that no damage could have been caused in Ecuador.

The common elements in all the statements are also systematically repeated by this witness:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Immediately, I felt my skin itch intensely. My whole body was itching. Above all, my face became very swollen and felt warm with the itching. It disfigured me so much that when the reporters from Telemar came to Mataje to investigate the sprayings, I did not want them to interview me because my face looked terrible. I also got bumps all over my skin. I had a rash that burned and my skin peeled quite a bit."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "Moreover, I had a terrible fever, an intense headache and I did not want to eat anything. I was very sick for about fifteen days."
- Loss of crops, and plants turning yellow. "After the spraying, the plants also died." "A few days after the spraying, we could see that the plants were dying. The fruits looked burned, black. The lemon turned black. The same thing happened to the

266 EM, Vol. IV, Annex 218 [Emphasis added].

267 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

268 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

plantain, it was black both outside and inside. The same happened to the cacao. We could not eat these fruits. The leaves were black, withered and falling off. The stems of several plants started to rot and, in the end, they all died."

- Alleged impacts on animals. "After the spraying, there were a lot of dead fish and shrimp. Usually, the fish and shrimp are below the water level. But, after the sprayings, they were floating on the surface of the river and going downstream with the current. I observed this immediately after the sprayings. We could not use fish or shrimp to eat because they were infected. In addition to the fish and shrimp, other animals also died. At home, we had chickens that began to die, little by little. I would go looking for the chickens and I would find them dead everywhere, one near the river, another one in the bush. In the end, most of the chickens died."
- Final dramatic statements. "After the sprayings, we could no longer sell the crops because they were ruined. With no crops to sell, we had to find other jobs to support ourselves."

Witness 36

(EM, Vol. IV, Annex 219)

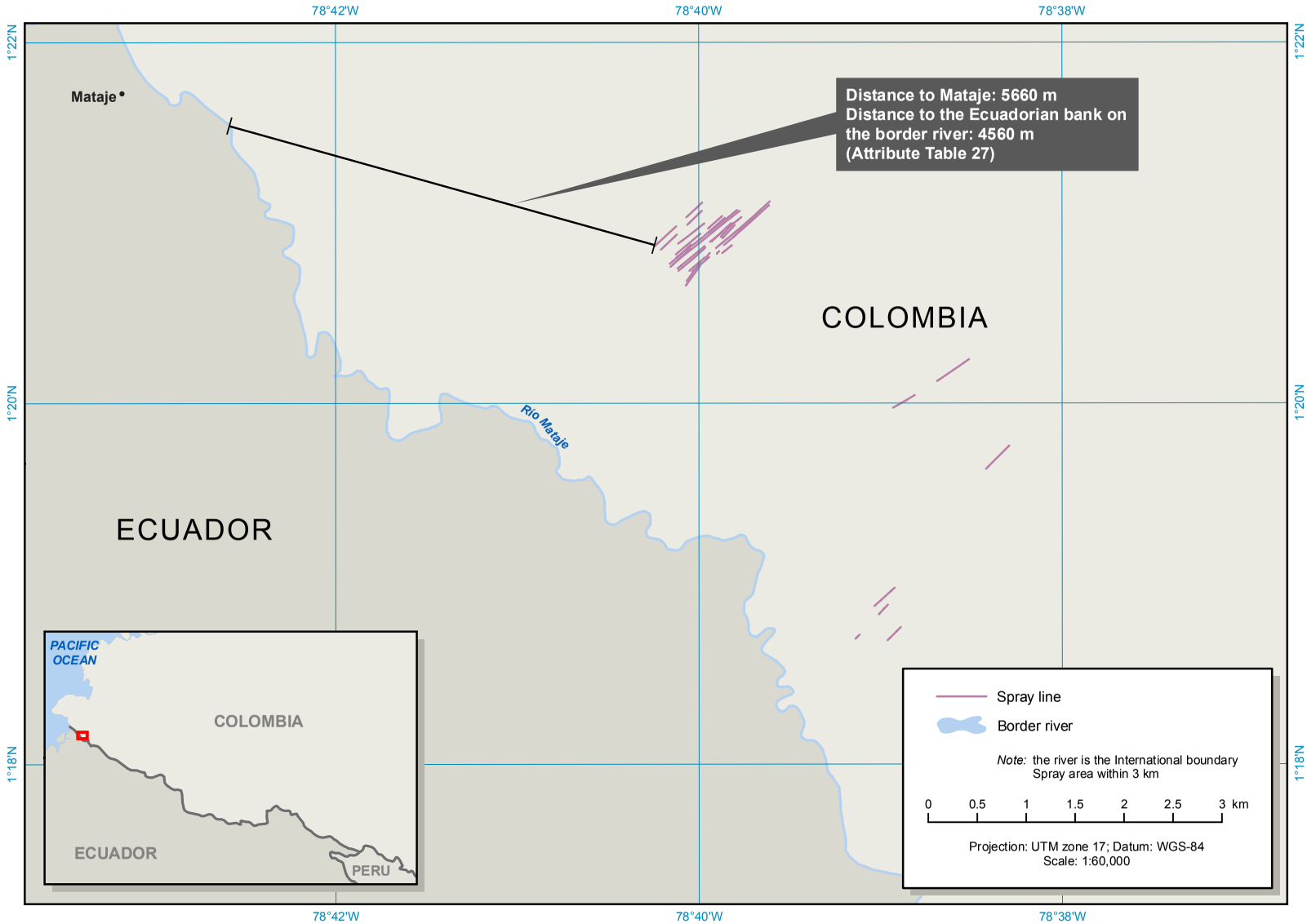


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 36)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[269] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[270] This shows that no damage could have been caused in Ecuador.

[269] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[270] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 36:

The witness states that she lived in Mataje, a few steps from the Mataje river. She claims that the first time that she saw the sprayings was in the year 2000. She was cleaning the land in her farm and she *saw planes and helicopters flying over the river*: "From the planes, a white rain was coming out. That rain fell on top of me and also on top of my son; it looked like grease on the skin." Then she describes the alleged impacts caused after that incident.[271]

The events shown in Figure 20 were sprayings in the relevant area in 2000. All of them were carried out on Colombian territory, at a minimum distance of over 4.5 kilometres from the Ecuadorian bank on the border river. Yet the witness claims that she "saw planes and helicopters flying over the river and that the spraying fell on top of her." The falsehood is evident.

But her falsity goes even further as she claims alleged effects on crops, plants and animals. Hewitt modeled the closest event to the witness's location and estimated a downwind deposition value of 0.192 g/ha.[272] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[273] This shows that no damage could have been caused in Ecuador, not even with the wind blowing toward Mataje.

The witness is also particularly dramatic: "I was so sick that they had to take me to the hospital in Esmeraldas where I was admitted for six days. I almost died." "In those days it was as if there was a plague that attacked all the children." None of these effects are caused by the spray mixture.

The statement's structure also follows the common script:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "But, on the following day, I woke up sick, with […]itchiness on my body." "My younger son developed bumps on his face, one could not even touch it, his skin was very swollen and irritated."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "But, on the following day, I woke up sick, with a stomachache, vomiting, diarrhea […]." "My younger son, Luis, and my other son, Segundo, became sick a few days

[271] EM, Vol. IV, Annex 219.

[272] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42

[273] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

after the spraying. They had a stomachache, vomiting and a strange skin irritation."

- Loss of crops, and plants turning yellow. "When I returned home, I saw that all the plantain had died. On my farm, I had plantain, chocolate and yucca. Very few chocolate plants survived the spraying. The leaves of the plants were withered. The plantain was stained with spots. Everything was burned as if someone had put a bomb there. The leaves of the yucca plant were drying up and falling off, the [sic] stem of the plant was drying and dying, the yucca itself came out rotten. It was no longer valuable, it could not be eaten."
- Alleged impacts on animals. "They kept harvesting the damaged yucca to feed my chickens, which died a week later."
- Dramatic statements: "The money for my family comes from selling the yucca and chocolate in San Lorenzo. But we no longer had anything to sell or to eat, and, in addition, we had the hospital debt."

Witness 37

(EM, Vol. IV, Annex 220)

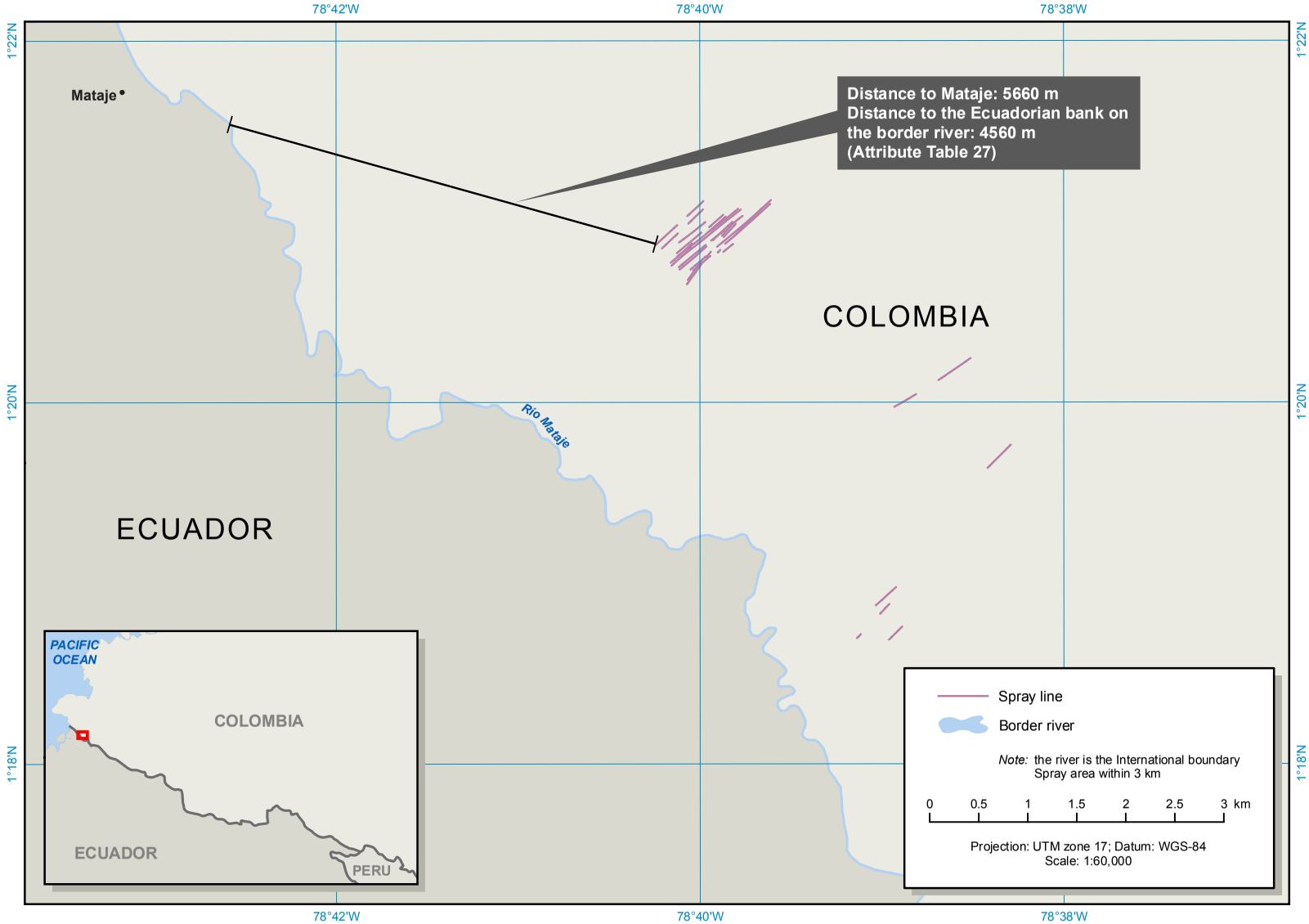


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 37)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[274] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[275] This shows that no damage could have been caused in Ecuador.

[274] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[275] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 37:

The witness states that he has "lived all [his] life in Mataje, a community that has twenty-five houses in the original town, and now about seventeen houses more inland, in the new town." He claims to remember three sprayings, and refers to the alleged effects after the first time, which was in the year 2000. He was working on his farm, at the edge of the river and allegedly he "*saw several planes and some helicopters coming from the Colombian side, dropping a liquid. The liquid looked like smoke and it fell on the ground and on my body*, it looked shiny."[276]

The events shown in Figure 20 were conducted on Colombian territory near the witness's location, at a distance of over 4.5 kilometres from the Ecuadorian bank on the border river. Yet the witness claims that "[t]he liquid looked like smoke and it fell on the ground and on my body." The falsehood is evident.

Hewitt also modeled this event and estimated a downwind deposition value of 0.192 g/ha.[277] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[278] This shows that no damage could have been caused in Ecuador, not even for plants and crops.

But still, the witness follows his script as follows:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "When it fell on my skin, I felt a very strong itch." "Two days after the sprayings, I developed bumps on my arms and face."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "I also felt it in my eyes and it affected my sight, which to this day has not recovered."
- Loss of crops, and plants turning yellow. "On my farm, more or less one cultivated hectare, I have planted cacao, yucca, plantains, and sugarcane, all of which have dried up. A few days after the sprayings, I noticed the effect on the leaves. They started to wrinkle and then turned yellow. Several weeks later, the plants died. The plantain plant and its fruit dried up, and we could not eat it because it had been ruined. The cacao dried up, including the leaves, and the tree died. Moreover, the yucca also rotted, even though the crop is below the ground; it turned black and the plant above the ground dried up."

---

[276] EM, Vol. IV, Annex 220.

[277] CR, Vol. II,, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42

[278] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

- Effects on soil and subsequent loss of productivity measured in quintals. “The land remained affected for several months, there was nothing there. For some years, we hardly planted anything because the land would not produce. Fortunately, now the land is recovering little by little.”
- Alleged impacts on animals. “I think the river was already contaminated with the mist that fell. I know because the shrimp and fish started to die immediately.” “On my farm, I have pigs, turkeys and chickens. Little by little, after the sprayings, they became thin and then died. I think they died because they were eating dead bugs found dead on the hill after the spraying.”
- He/she had never experienced anything similar before. “This had never happened to me before, it was something very odd.”
- Final dramatic statements. “It is hard [for the *campesinos*] to invest all this work only to lose their crops. We were living off of the agriculture, but because of the spraying, we could no longer feed our families with the crops. We also no longer had anything to sell after the sprayings. There was a lot of suffering in the community. There was nowhere to go; we did not have the means to move to the city.”

Witness 38

(EM, Vol. IV, Annex 221)

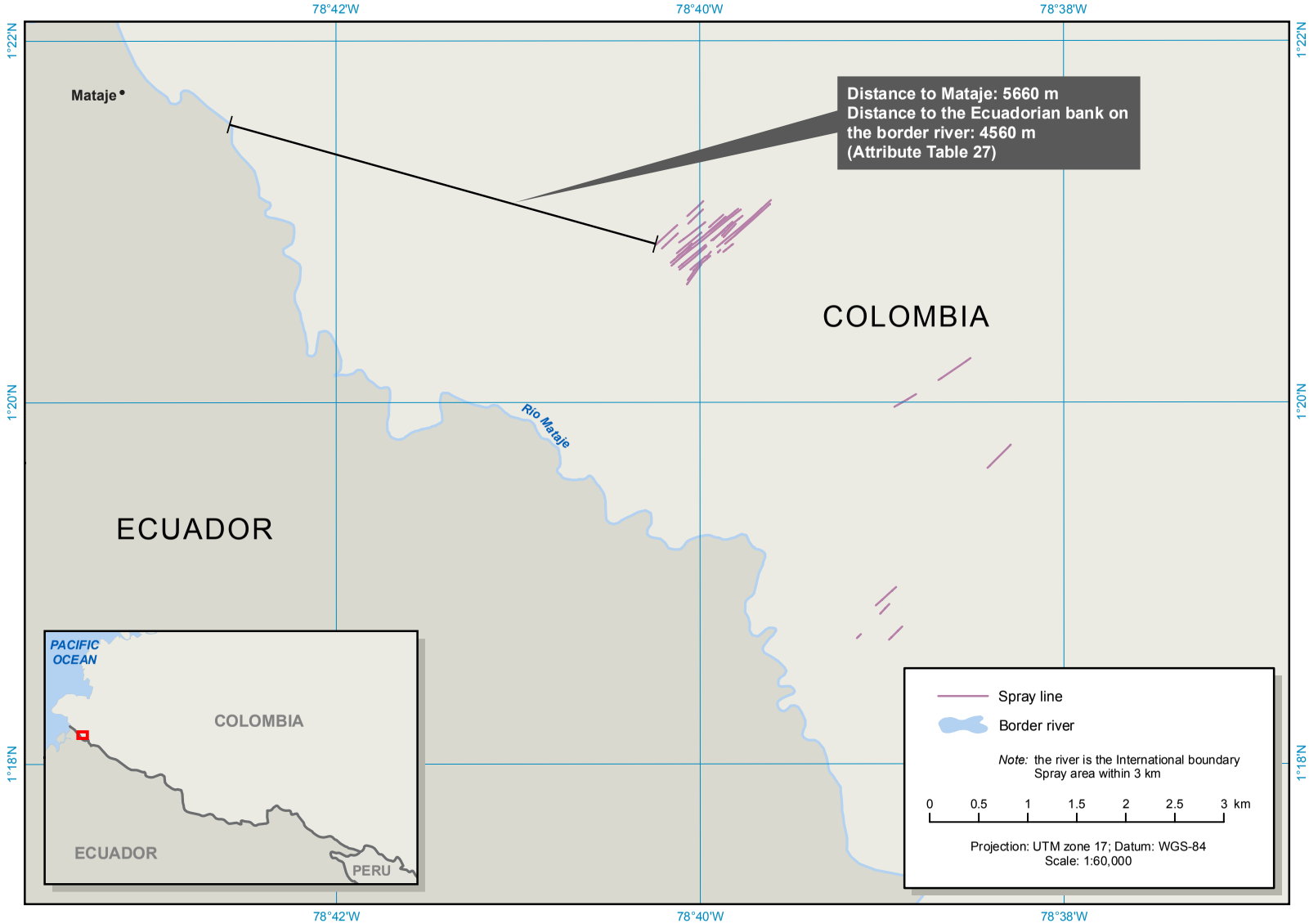


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 38)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[279] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[280] This shows that no damage could have been caused in Ecuador.

[279] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[280] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 38:

The witness states that he came to Mataje when he was 22 years old: "I am a farmer and until last year my house was located on the banks of the Mataje River. I remember seeing sprayings on three occasions. The first time that I saw the sprayings was in the year 2000, I was working on my farm, which is farther inland from the river. I saw several planes escorted by a helicopter. The planes were releasing a white smoke that, with the wind, was dispersed in the air. *When I saw the planes, I hid by a tree so that the liquid would not fall on me too much, but it still fell on me*."[281]

Figure 20 shows the spraying in the area in 2000. The closest event was conducted on Colombian territory at a distance of over 4.5 kilometres from Ecuadorian bank on the border river, and yet the witness claims that he "hid by a tree so that the liquid would not fall on [him] too much, but it still fell on [him]." The falsehood is evident. Colombia has shown so with an objective source, the spray data furnished to Ecuador by the Department of State.

Furthermore, Hewitt modeled the closest event and estimated a downwind deposition value of 0.192 g/ha.[282] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[283] This shows that no damage on plants and crops could have been caused in Ecuador, not even with the wind blowing from the north to the south.[284]

Moreover, the following shows that the statement is above all a pre-prepared script:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Shortly thereafter, I had bumps on my skin; they heal with medicine but I still get them to this day."
- Loss of crops, and plants turning yellow. "A few days after the sprayings, the plants were also affected; the leaves would turn red, become dry and fall off. The trees were left bare, without leaves. Everything had a scorched appearance. On my farm, I had planted yucca, sugar cane, cacao, and plantain. All my crops dried up completely; they were dead, but completely dead. The land, the forest had become

[281] EM, Vol. IV, Annex 221.
[282] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.
[283] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.
[284] See CR, Vol. I, Chap. 2, sec. C, paras. 2.221-2.224; see also CR, Vol. II, Annex 19: IDEAM Climate Characterization (2011).

pampas, everything burned. There was nothing to eat in the community, the bunches that were green dried up."

- Effects on soil and subsequent loss of productivity measured in quintals. "After the sprayings, we did not re-plant this land for a long time."
- Alleged impacts on animals. "A couple days later, dead fish and shrimp appeared. They were leaning against the edge of the river as if escaping from the water, and dying there."
- He/she had never experienced anything similar before. "I had never suffered from this before, and now, I cannot get rid of it." "I had never seen anything like it before." [concerning the alleged dead shrimps].
- Final dramatic statements. "The sprayings have caused us a lot of damage. I left old Mataje, fleeing from all of this, now I live near there but farther inland, in the new village of Mataje. I had no choice; things in Mataje were very difficult after the sprayings, we could no longer live there."

Witness 39

(EM, Vol. IV, Annex 222)

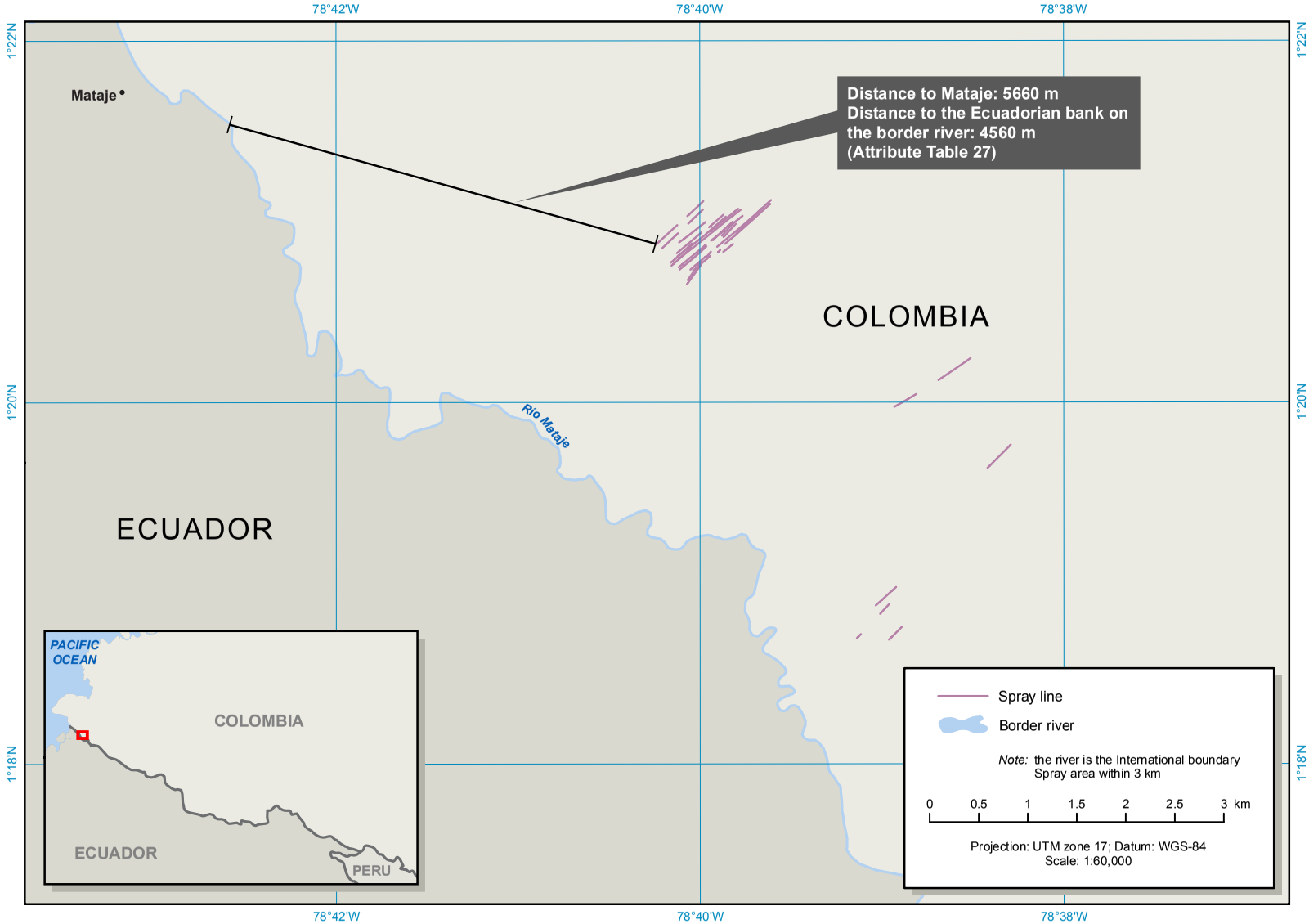


Figure 20. Mataje, Spray Lines in 2000 (Witnesses 30-32-33-34-36-37-38-39)

Mataje, 2000 (Witness 39)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE IN 2000 (Witnesses 30-32-33-34-36-37-38-39)																				
OBJECTID	LINE_ID	TIME	ALTITUDE	XTRACK	MPH	HEADING	S	SPRAY_RATE	DOP	SV	USED	DF	STNID	ASCIINAME	LENGTH	MONTH	SWATH	MISSION	AIRCRAFT	A_C_CROP	CROP
932	002835	11:39:53.24	497,500	-249,73	151,900	46,400	1	62,390	0,800	10	9	0	-1	i140djac	296,179	0009	50	Coca	T-65	T-65_Coca	Coca
PARAMETERS		11:39	FEET		MILES/HOUR									14 September 2000							

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
151	97	54

Attribute Table 27

MATAJE:

Distance of the closest spray line to Mataje location: 5,660 metres, nearly six kilometres. Distance to the Ecuadorian bank on the border river: 4,560 metres, over four and a half kilometres.

Hewitt modeled this event and estimated a deposition value of 0.192 g/ha.[285] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[286] This shows that no damage could have been caused in Ecuador.

[285] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[286] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 39

The witness states that she lives in Mataje and her house is next to the Mataje River. The whole town is located near the river. The first spraying that she remembers was in the year 2000, and that was the one that allegedly "affected [her] the most": "I was in the river with my children." "The planes were flying over the river and dropping a whitish-gray liquid."[287]

The events shown in Figure 20 were the spraying lines carried out on Colombian territory in the relevant area. All of them are at a minimum distance of over 4.5 kilometres from the Ecuadorian bank on the border river, and yet the witness claims that "[t]he planes were flying over the river and dropping a whitish-gray liquid." The falsehood is evident.

The alleged effects on plants, crops and animals are contradicted by Dr Hewitt's modelling. He estimated a downwind deposition value of 0.192 g/ha.[288] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[289] This shows that no damage could have been caused in Ecuador.

Finally, the witness adheres to his script as follows:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "The poison that fell over us caused our body and eyes to itch. A few days later, my children had bumps on their bodies that itched a lot."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea.
- Loss of crops, and plants turning yellow. "After the sprayings, the plants began to dry up little by little, they became discolored, they seemed burned and, in the end, we had to cut them because they were all dead. The other plants that were near the house started to lose their leaves and dry up, they also broke, and then died."
- Effects on soil and subsequent loss of productivity measured in quintals. "Afterward, we did not re-plant because we were afraid that the same thing would happen again with another spraying."
- Alleged impacts on animals. "After the sprayings, there were a lot of dead fish in the river. My son Gabriel told me that he had seen a lot of *minchillas*, which are a

[287] EM, Vol. IV, Annex 222.

[288] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 42.

[289] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

type of shrimp, dead in the river." "The chickens were also affected, and every now and then they would fall dead on the ground."

- He/she had never experienced anything similar before.

Final dramatic statements. "Some people left the town because one could no longer live there. We could not plant, and we had to look for another place where we could be and plant peacefully without being afraid that the planes might return and ruin our crops. Several families moved from old Mataje to the new town, which is nearby but farther into the interior."

Witness 40

(EM, Vol. IV, Annex 223)

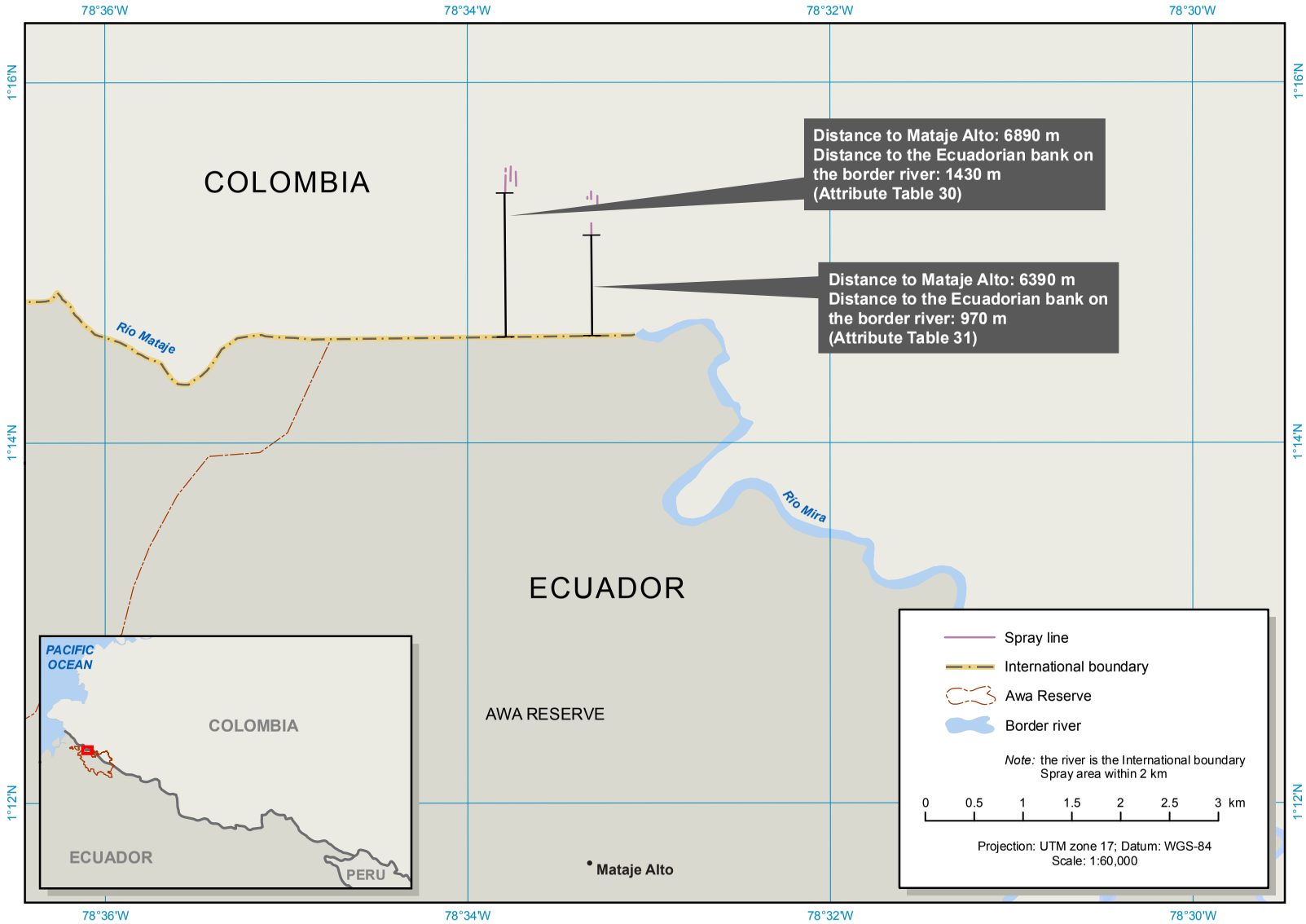


Figure 23. Awa-Mataje Alto, Spray Lines in 2002 (Witnesses 40-41)

Mataje Alto, 2002 (Witness 40)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE ALTO IN 2002 (Witness 41)																						
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
5051	66	E142Q4AC	99-2	Right	45		1.25808638	-78.56322520	693	0,770	0	0	21,900	208,300	2,800	0	E142Q4AC	173,351	0205	85	OV-10	Coca	OV-10_Coca
PARAMETERS		14 May 2002				NO REGISTRA			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
211	171	40

Attribute Table 30

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO MATAJE ALTO IN 2002 (Witness 41)																						
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
5085	101	E142SGAC	99-2	Right	62		1.25364475	-78.55533995	723	0,770	0	0	31,700	197,100	2,500	0	E142SGAC	123,629	0205	85	OV-10	Coca	OV-10_Coca
PARAMETERS		14 May 2002				NO REGISTRA			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
220	183	37

Attribute Table 31

MATAJE ALTO:

Distance of the two closest spray lines to Mataje Alto location: 6890 metres and 6390 metres.

Distance to the Ecuadorian bank on the border river: 1430 metres and 970 metres, respectively.

Hewitt modeled these events and estimated deposition values of 0.08 g/ha and 0.14 g/ha, respectively.[290] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[291] This shows that no damage could have been caused in Ecuador.

[290] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 55 and 46.

[291] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 40:

The witness states that he "was born in the Mataje Alto Awá Community, "I now live in Ibarra, as of a year ago." Then he adds: "During my time in Mataje Alto, I remember having experienced the fumigations about five times. I think they sprayed every three to seven months, perhaps once or twice a year. The first time was in 2002, when *I saw three planes and a helicopter. The helicopter was flying higher than the planes, and a type of water was coming out of the planes, it looked like a steam was being released."* He further says that "[t]he third time they sprayed was fatal for [their] community" as "this time they crossed to Ecuadorian territory, Awá territory." [292]

The witness provides no description of time or place; the statement reads more as an opinion than a testimony. However, since he claims that the first time was in 2002 the closest lines to Mataje Alto in that year have been analysed. Figure 23 shows that the closest spray events were conducted at distances of between 6.3 and nearly 7 km from the location of Mataje Alto, and yet the witness claims that he "saw three planes and a helicopter. At the distances involved, none of the alleged effects on plants and crops could have been caused in Ecuador. The falsehood is evident.

This was also confirmed by Dr Hewitt who modeled the closest events and estimated downwind deposition values of 0.08 g/ha and 0.14 g/ha, respectively.[293] Since the level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops,[294] no damage could have been caused in Ecuador.

The statement's script-like structure is also quite clear from the following assertions:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Some people also had spots on their skin."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "A few days later, I was working at the health post, it was morning and three children came in sick with diarrhea, vomiting, high fever, and stomach ache." "After a few days, the adults started coming in with fever, vomiting, headache, diarrhea and stomachache."

---

[292] EM, Vol. IV, Annex 223.

[293] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, row 55 and 46.

[294] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

- Loss of crops, and plants turning yellow. “From the first time they sprayed, our food supply was affected. By the third spraying, we no longer had anything to eat, not from the domestic crops nor from the plants in the mountain. The majority of the plants were either sick or dead.” “Since 2002, the plants began to get sick, the leaves were yellowish and had spots, as if they were burned. They would dry up and fall off, and we did not know why. The plant would not develop, there was a growth delay and there was hardly any production.” “It was probably five days later that some hectares of the natural forest, near the Mataje River, died. Three days later the plants began to dry up and fall off, as if they were burned. The leaves fell off the plants and all the branches died. All the plants, big and small, were destroyed. Several species of wild plants that were in that hectare died.”
- Effects on soil and subsequent loss of productivity measured in quintals.
- He/she had never experienced anything similar before. “We were concerned because everyone exhibited the same symptoms, which *we had never seen before*.” “The plant would not develop, there was a growth delay and there was hardly any production. *We had never seen this before*.” “The *mojarras* had on their tail and fins hard tiny bumps, and their eyes also looked pale. We thought that was very strange, *we had never seen anything like it before*.”
- Final dramatic statements. “As a result of the damages to health, nature, and our sources of food and spirituality, some people had to move to other Awá communities within the reserve, which were farther from the border and not affected by the sprayings. They made this decision in order to avoid health problems caused by the fumigations and the death of their crops, because they no longer had the means to survive.”

Witness 41

(EM, Vol. IV, Annex 224)

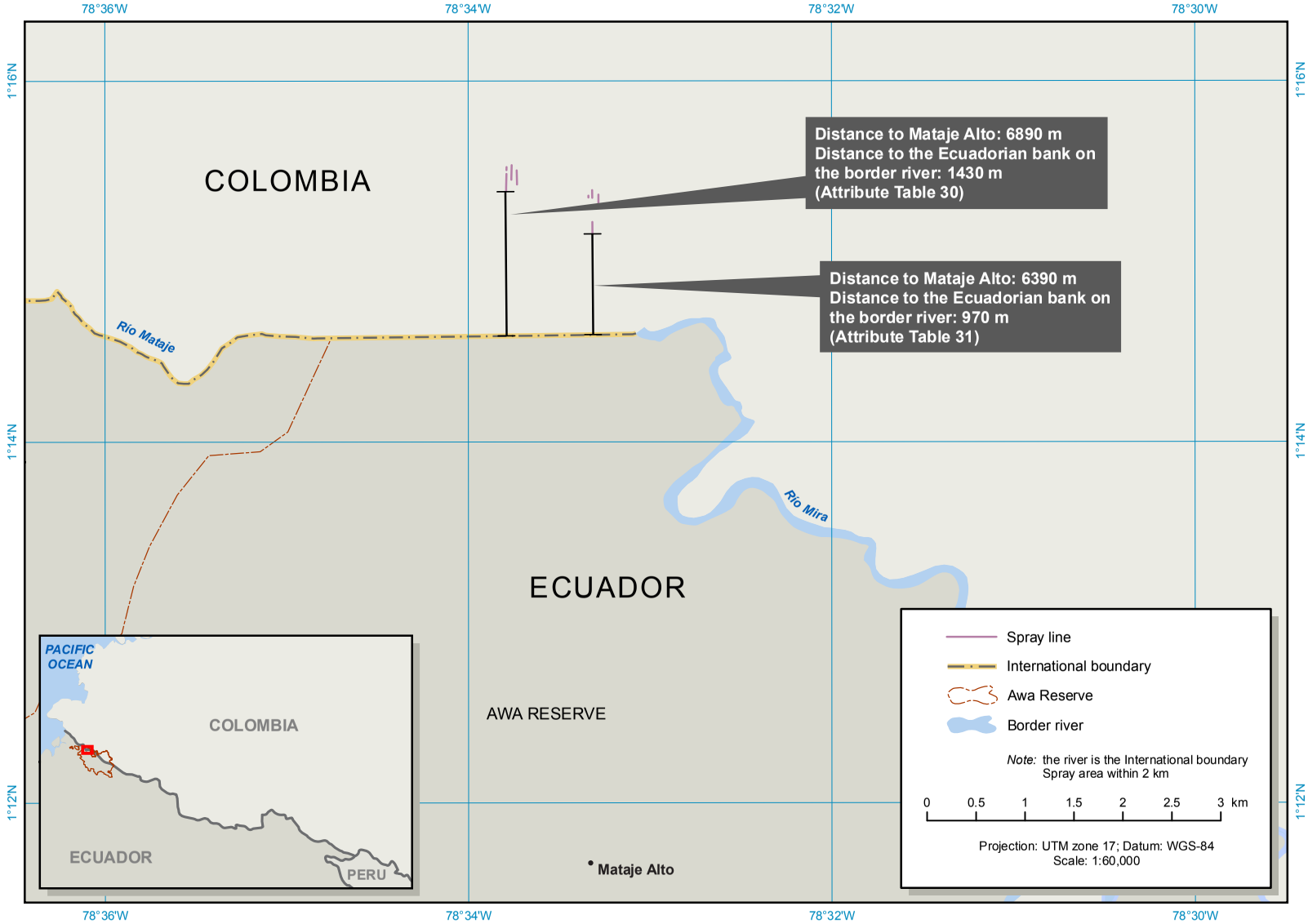


Figure 23. Awa-Mataje Alto, Spray Lines in 2002 (Witnesses 40-41)

Mataje Alto, 2002 (Witness 41)

Metadata of the closest spray lines

ATTRIBUTE TABLE OF THE CLOSEST SPRAY LINE TO MATAJE ALTO IN 2002 (Witness 41)																							
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
5051	66	E142Q4AC	99-2	Right	45		1.25808638	-78.56322520	693	0,770	0	0	21,900	208,300	2,800	0	E142Q4AC	173,351	0205	85	OV-10	Coca	OV-10_Coca
PARAMETERS		14 May 2002				NO REGISTRA			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
211	171	40

Attribute Table 30

ATTRIBUTE TABLE OF THE SECOND CLOSEST SPRAY LINE TO MATAJE ALTO IN 2002 (Witness 41)																							
FID	SEG	FILE_NAME	MISSION	SIDE	LINE	START_TIME	LATITUDE	LONGITUDE	ALTITUDE	DOP	FLT_TIME	FLT_LENGTH	OTE	SPEED	VOLUME	AREA	LOG	LENGTH	MONTH	SWATH	AIRCRAFT	CROP	A_C_CROP
5085	101	E142SGAC	99-2	Right	62		1.25364475	-78.55533995	723	0,770	0	0	31,700	197,100	2,500	0	E142SGAC	123,629	0205	85	OV-10	Coca	OV-10_Coca
PARAMETERS		14 May 2002				NO REGISTRA			FEET					MILES/HOUR									

ADDED ATTRIBUTES		
Spray Line Altitude over MSL (Metres)	Ground Altitude over MSL (Metres)	Spray Line Altitude over Ground Level (Metres)
220	183	37

Attribute Table 31

MATAJE ALTO:

Distance of the two closest spray lines to Mataje Alto location: 6890 metres and 6390 metres.

Distance to the Ecuadorian bank on the border river: 1430 metres and 970 metres, respectively.

Hewitt modeled these events and estimated deposition values of 0.08 g/ha and 0.14 g/ha, respectively.[295] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[296] This shows that no damage could have been caused in Ecuador.

[295] CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 55 and 46.

[296] See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

Witness 41:

The witness states that he was raised in Mataje Alto and he has always lived there: "I remember particularly that in the year two thousand and two we were affected by the sprayings. That first day, I was in school and I heard the planes and helicopters, which they [sic] arrived a few minutes later. Since I was a fifteen year-old boy, I was curious and I came out of the school to see them. *I saw about three planes, accompanied by some helicopters. They were coming from Colombia and turning around over Awá territory on the Ecuadorian side.*" [297]

The events shown in Figure 23 were the sprayings in 2002 near the witness'slocation. All of them are on Colombian territory, at distances of between 6.3 and nearly 7 km from the location of Mataje Alto, and yet the witness claims that the praying caused effects on plants and crops. The falsehood is evident.

Hewitt further confirmed this after modeling the closest events and estimating downwind deposition values of 0.08 g/ha and 0.14 g/ha, respectively.[298] The level of concern for amphibians, the most sensitive animal species according to Ecuador, is 1,368 g/ha; and between 36 and 1,958 g/ha for various crops.[299] This shows that no damage could have been caused in Ecuador.

The witness also adheres to his script in the following fashion:

- Alleged impacts on human health:
  - Serious skin irritation/itching and bumps. "Some of the people in the community had bumps all over their bodies." "Also, some of them had white spots on their skin and hives. Even I had some white spots on my arms."
  - Eye burning/Chiefly on children, headaches, vomit, fever and diarrhea. "People also suffered from headaches, stomach aches and vomiting."
- Loss of crops, and plants turning yellow. "The healers said that the *lengua de vaca* and other medicinal plants died in the sprayed sector of the forest." "After the sprayings, all the crops began to dry up. They turned yellow two or three days after the sprayings. The leaves of the sugarcane became withered and they fell off. The yucca leaves also withered, and the maize completely died within a week after the sprayings. "[A]fter the sprayings we lost several crops such as maize."

---

297 EM, Vol. IV, Annex 224.

298 CR, Vol. II, Annex 2: Hewitt Spray Events Modeling (2011), pp. 4-5, Table of Model Results, rows 55 and 46.

299 See CR, Vol. II, Annex 1: Hewitt Report – Response to Giles (2011), para. 8, p. 5; see also CCM, Vol. III, Annex 131-B, p. 330.

- Effects on soil and subsequent loss of productivity measured in quintals. “After the spraying, people planted again but the land no longer produced as before. It affected almost all of the produce; to this day, the crops do not produce as before.”
- Alleged impacts on animals. “After the spraying, many of the chickens that we raised became sick, they would not walk but rather remained seated, and within a few days some of them died. The chicks either remained small or did not survive. We also raised some ducks that either got sick or died.” “When we went to the primary forest to hunt after the spraying, we […] saw some dead animals such as deer, *guatin* and sloth.”
- He/she had never experienced anything similar before. With regard to the alleged bumps: “It was strange, I had not seen that before.” With regard to the animals allegedly found dead in the forest: “I was very surprised to see these animals dead.”
- Final dramatic statements.

LIST OF ANNEXES

VOLUME II

SCIENTIFIC AND TECHNICAL EXPERT REPORTS

OTHER EXPERT REPORTS

Annex 8 Expert Report of Dr G. Marcella, Ph.D. on behalf of the DynCorp Defendants in *Arias/Quinteros v. DynCorp* (D.D.C.), Jan. 2011.

Annex 9 Expert Report of Dr J.M. DiTomaso, Ph.D. prepared for the Dyncorp Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011.

Annex 10 Expert Report of Dr K.R. Solomon, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011.

Annex 11 Expert Report of Dr A. Atalay, Ph.D., CPSS, prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011.

Annex 12 Expert Report of Dr J.P. Giesy, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011.

Annex 13 Expert Report of Dr R.D. Smalligan, M.D., M.P.H., prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011.

Annex 14 Expert Report of Dr R.C. Ploetz, Ph.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011.

Annex 15 Expert Report of Dr R.I. Krieger, Ph.D. prepared for the Defendants in *Arias/Quinteros v. Dyncorp* (D.D.C.), Jan. 2011.

Annex 16 Expert Report of Dr G.M. Williams, M.D. on Behalf of the Defendants in *Arias/Quinteros v. Dyncorp*, Jan. 2011.

COLOMBIAN OFFICIAL DOCUMENTS

Annex 17 Testimony of a Police Officer victim of a land mine, Annual Report by the Anti-Narcotics Directorate of the Colombian National Police (DIRAN), *Results of the Breaking Point and Historical Management in the Fight Against Drug Trafficking for the year 2008*.

Annex 18 Anti-Narcotics Directorate of the Colombian National Police (DIRAN), Eradication of Illicit Crops Division, *Analysis of Certain Spraying Operational Aspects*, Oct. 2011:

I. Analysis of time records
II. Verification of wind conditions (beeper)
III. Spraying mission cancellation due to weather
IV. Spraying data and witness statements confronted

Annex 19 Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), *Climate Characterization of the Nariño and Putumayo Border Zone with Ecuador*, Dec. 2011.

VOLUME III

Annex 20 National Narcotics Directorate (DNE), *Environmental Management Plan (EMP) Eradication of Illicit Crops, Chapter VII, Identification and Assessment of Environmental Impact*, 30 Oct. 1998.

Annex 21 National Narcotics Directorate (DNE), *Environmental Impact of Illicit Coca Crops and their Eradication by Aerial Spraying with Glyphosate in the Bio-geographical Region of the Colombian Amazon and Orinoco Basins*, Dec.1994.

Annex 22 Colombian Law 30 of 1986.

Annex 23 Colombian Law 99 of 1993.

Annex 24 Note from the Minister for the Environment, Mr. Juan Mayr Maldonado, to the Secretary General of the Colombian Senate, 10 Aug. 2001.

Annex 25 Note N° 0001-1-928 of 17 August 2001 from the Ombudsman requesting a public hearing to the Minister for the Environment on the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate, and the corresponding minutes of the hearing, 24 Aug. 2001.

Annex 26 Note N° 01888 from the National Narcotics Directorate (DNE), Appeal submitted by DNE, of Order 599 of 1999 from the Ministry for the Environment, 1 Feb. 2000.

Annex 27 Council of State of Colombia, Chamber of Contentious Administrative Affairs, Order of 15 Aug. 1995.

Annex 28 National Narcotics Council, Minutes N° 01 of 8 Mar. 1996.

Annex 29 Note N° 11430 from the Ministry of Justice and Law, National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan for the Application of Glyphosate in the Eradication of Illicit Crops, 30 July 1998.

Annex 30 Note N° 16341 from the Ministry of Justice and Law, National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing Chapter VII of the Environmental Management Plan for the Application of Glyphosate in the Eradication of Illicit Crops, 30 Oct. 1998.

Annex 31 National Narcotics Directorate (DNE), Environmental Management Plan for the application of glyphosate herbicide in the eradication of illicit crops with Supplementary Information, submitted by the DNE to the Ministry for the Environment, 13 Sep. 2000.

Annex 32 Note N° 24171 from the National Narcotics Directorate (DNE) to the Ministry for the Environment, 8 Aug. 2001.

Annex 33 Note N° 32280 from the National Narcotics Directorate (DNE) to the Ministry for the Environment enclosing the Environmental Management Plan (EMP) of the Program for the Eradication of Illicit Crops by Aerial Spraying with Glyphosate (PECIG), 6 Nov. 2001.

VOLUME IV

Annex 34 Ministry for the Environment, Technical Opinion N° 1059, 24 Sep. 2003.

Annex 35 Ministry of Health, Toxicological Opinion N° LP – 0173 – 93, 2 Apr. 1993; Toxicological Opinion N° MP – 12118 – 2001, 5 Nov. 2001; Toxicological Opinion N° LP – 12499 – 2002, 29 Apr. 2002.

Annex 36 Note N° 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.

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 Jan. 2003.

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).

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).

Annex 40 Note N° 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 Nov. 2011.

Annex 40-A: Ministry for the Environment, *Order N° 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 Dec. 2005.

Annex 40-B: Ministry for the Environment, *Order N N° 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 Dec. 2005.

Annex 41 List of External Environmental Audits by the National Narcotics Directorate (DNE):

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 Mar. 1997.

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 Sep. 2000, 18 Oct. 2000.

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 Nov. to 9 Dec. 2003, 18 Dec. 2003.

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. Nov. to 4 Dec.2004, 7 Dec. 2004.

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 Dec. 2006 to 18 Jan. 2007, Jan. 2007.

Annex 42 Note N° 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.

Annex 43 Minutes and Orders of prior consultation processes with indigenous communities, in compliance with the Colombian Constitutional Court's ruling SU-0383.

ECUADORIAN OFFICIAL DOCUMENTS

Annex 44 Ecuadorian Foreign Ministry Court Filing N° 937-2004, 22 Oct. 2004.

Annex 45 Commission on Transparency and Truth for the Angostura Case, Report, Quito, Dec. 2009.

UNITED STATES OFFICIAL DOCUMENTS

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 Sep. 2011.

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 Sep. 1998.

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.

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.

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 Nov. 1996.

Annex 51 United States Embassy 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 Sep. 2011.

Annex 52 Department of State Sample Contractor Evaluations, Documents G 93, L 16, L 26, L 34 and L 41.

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.

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.

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.

Annex 53-D: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2005.

Annex 53-E: Department of State Information Package on the Certification of the Aerial Eradication of Illicit Coca and Opium Poppy in Colombia, 2006.

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.

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.

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.

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 Sep. 2011.

VOLUME V

Annex 56 United States Environmental Protection Agency (EPA), Memorandum of 13 May 2003, Technical Review of the six acute toxicity studies on the spray mixture for Eradication of Illicit Crops in Colombia.

Annex 56-A: *Six Acute Toxicity Studies with Spray- Charlie,* SLI Study N° 3596.16, 20 Feb. 2003.

Annex 56-B: *Six Acute Toxicity Studies with Spray- Alpha,* SLI Study N° 3596.3, 3 Sep. 2002.

Annex 56-C: *Six Acute Toxicity Studies with Spray- Bravo,* SLI Study N° 3596.10, 4 Sep. 2002.

Annex 57 Letter by Ms Rebecca L. Puskas to the United States Environmental Protection Agency, item (18), p. 4, 11 Nov. 2008.

Annex 58 Embassy of the United States of America, List of Aerial Eradication Verification Missions since 1997.

Appendix: Implementation of the verification protocol January – July 1998, carried out October 18-23, 1998. Section 6: *Qualitative environmental evaluation of spraying and illegal crops;* Section 6.2.: *Environmental Impact of Illegal Crops*.

Annex 59 United States Department of State, Bureau for International Narcotics Matters, Herbicide Selection for Coca Eradication, May 1984.

VOLUME VI

UNITED NATIONS DOCUMENTS

Annex 60 United Nations Office on Drugs and Crime (UNODC), *Colombia Coca Cultivation survey 2010*, June, 2011, pp. 16, 26, 30, 31 and 73.

OTHER DOCUMENTS

Annex 61 Decision N° 486 of the Commission of the Cartagena Agreement on the Common Provisions on Industrial Property, Art. 260, 14 Sep. 2000.

Annex 62 Document 148, Dyncorp Case No. 1:07CV01042(RWR), United States District Court for the District of Columbia, 18 Sep. 2009.

Annex 63 Acción Ecológica, *Report on the Investigation of the Fumigations' Impacts on the Ecuadorian Border* (June 2001), p. 3 (Page not included either in the Annex 161 of EM Vol. IV, or in the original annexes).

Annex 64 Organismo Andino de Salud, Hipolito Hunanue Agreement, *Analysis of Health Situation in the Border, Pacific/Andean Corridors Nariño/Tulcán - San Lorenzo (Colombia - Ecuador)*, 2009.

Annex 65 Pineda-Medina, Juan and Naizot, Anne-Lise/ FLACSO-Ecuador, *Social impact study of territorial threats in Guadualito and Balsareño villages, Awa Territory. Advances in the environmental impact study in Guadualito and Balsareño.*

Annex 66 Press item: "*Legal Action. Ecuador accuses Colombia before The Hague*." Migalhas Latinoamericanas, 1 Apr. 2008.

Annex 67 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 193, Witness 5).

Annex 68 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 197, Witness 9).

Annex 69 Plaintiff Questionnaires, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 199, Witness 11) personally and on behalf of her deceased daughter.

Annex 70 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 200, Witness 12).

Annex 71 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 201, Witness 13).

Annex 72 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 204, Witness 18).

Annex 73 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 217, Witness 33).

Annex 74 Plaintiff Questionnaire, *Arias/Quinteros v. Dyncorp,* D.D.C. (EM Vol. IV, Annex 220, Witness 37).