



A TOXIC LEGACY

THE CASE FOR A MEDICAL STUDY OF THE LONG-TERM HEALTH IMPACTS OF THE TRAFIGURA TOXIC WASTE DUMPING

AMNESTY
INTERNATIONAL



Amnesty International is a global movement of more than 7 million people who campaign for a world where human rights are enjoyed by all.

Our vision is for every person to enjoy all the rights enshrined in the Universal Declaration of Human Rights and other international human rights standards.

We are independent of any government, political ideology, economic interest or religion and are funded mainly by our membership and public donations.

© Amnesty International 2018

Except where otherwise noted, content in this document is licensed under a Creative Commons (attribution, non-commercial, no derivatives, international 4.0) license.

<https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode>

For more information please visit the permissions page on our website: www.amnesty.org

Where material is attributed to a copyright owner other than Amnesty International this material is not subject to the Creative Commons licence.

First published in 2018

by Amnesty International Ltd
Peter Benson House, 1 Easton Street
London WC1X 0DW, UK

Index: AFR 31/7594/2018

Original language: English

amnesty.org



Cover photo: Maize growing next to one of the sites where toxic waste was dumped in August 2006, at the domestic waste dump at Akouédo, Abidjan (UNDAC site reference 1.1). July 2016 © Amnesty International

**AMNESTY
INTERNATIONAL**



UPDATE

On 30 January 2018, the United Nations Environment Programme (UNEP) published their report on the *Environmental Audit of the Sites Affected by the Dumping of Toxic Wastes from the “Probo Koala”*.¹ The long-awaited report, whose publication had been delayed several times, was the result of an environmental audit carried out in July 2016 and January 2017.

In June 2012, the Government of Côte d’Ivoire formally requested that UNEP carry out an independent and scientific environmental audit of the sites, which had been affected by the dumping of toxic waste from the Probo Koala in 2006. UNEP was tasked with establishing whether the sites continued to pose an environmental or public health risk, and with making recommendations related to any further or corrective clean-up measures that would be needed if any of the sites were found to still be polluted. It’s important to note that the main aim of the audit was not to assess and make a determination as to whether any pollution found at the sites was caused by the toxic waste from the Probo Koala in 2006. UNEP stated that:

“[I]t would not have been scientifically possible to correctly attribute any identified chemical contamination to a single event that took place ten years prior to the audit, particularly as the sites were not secured after the dumping and had been exposed to multiple sources of pollution since that time.”²

The Government also requested that UNEP review the public health studies related to the toxic waste dumping that had been conducted in Côte d’Ivoire to date and suggest additional studies taking into consideration the findings of the audit. UNEP plans to publish the results of the review and any further recommendations in a separate report following the dedicated meeting of public health experts in Abidjan in 2018.³

THE UNEP AUDIT

In July 2016 and January 2017, a UNEP team of four international experts took samples of soil, water, air, sediment, molluscs, fruit and vegetables at 17 sites⁴ generally accepted to have been affected by the dumping of toxic wastes, as well as at three control sites. During both trips, the UNEP team was joined in the field by three experts from the Ivorian Anti-Pollution Center (CIAPOL), who “had first-hand knowledge of the original dumping event and the subsequent clean-up and environmental monitoring initiatives”.⁵

Using the various analyses carried out in 2006 of the chemical composition of the toxic waste to determine what to test for, the key pollutants that UNEP was looking for were petroleum hydrocarbons, sulphur compounds and heavy metals. By testing the pH value, UNEP also measured the potential impact of high levels of sodium hydroxide on the soil.⁶

¹ United Nations Environment Programme, *Environmental Audit of the Sites Affected by the Dumping of Toxic Wastes from the “Probo Koala (Environmental Audit)*, 2018, available at https://postconflict.unep.ch/publications/Cote%20d'Ivoire/ProboKoalaAudit2018_EN.pdf (hereafter UNEP, *Environmental Audit*).

² UNEP, *Environmental Audit*, p.19

³ UNEP, *Environmental Audit*, p.19. UNEP’s report anticipated this meeting occurring in 2017.

⁴ Originally, the UNEP Audit was intended to cover 18 sites that had been affected by the toxic waste dump, but it was not possible to take samples at the Abobo Plaque dumping site.

⁵ UNEP, *Environmental Audit*, p.23

⁶ UNEP, *Environmental Audit*, p.22

In total, the UNEP team collected 130 samples. The laboratory analyses found that none of the toxic waste dumpsites “show contamination exceeding the limits set by the Government of Côte d’Ivoire for remediation”.⁷ Even when judged against accepted international levels, none of the sites showed a level of contamination requiring additional clean-up.

UNEP did find, however, that two of the dumpsites – Koumassi, where there are many small to medium-scale industrial plants, and the Akouédo municipal domestic dumpsite – showed elevated levels of pollution and pollutants in comparison with control sites.⁸

UNEP also took samples from two other places of interest: silos that stored suspected contaminated maize in the port of Abidjan and a site in Agboville where maize that was potentially indirectly impacted by the toxic waste was composted. The silos that stored suspected contaminated maize were found to be free of any of the pollutants linked to the Probo Koala wastes. The site in Agboville showed elevated levels of chromium. These levels were above both the standards used to monitor the composting process, and the international levels.⁹

The UNEP report made a number of recommendations specifically in relation to the various sites tested. UNEP recommended that the Agboville maize composting site be remediated and an environmental assessment of the Koumassi area be carried out. It also recommended that: this assessment serve as a basis for developing an action plan for mitigating impacts on public health; workers in Koumassi be provided with personal protection equipment and training on occupational health; and guidelines on emissions controls and waste management for small and medium-scale industries be established.¹⁰

In light of the Government’s stated intention to close the Akouédo municipal waste disposal site, UNEP recommended that a “comprehensive environmental due diligence survey be conducted” and that “[d]ue diligence [is] needed for decommissioning”.¹¹ Until the domestic waste site is decommissioned, however, UNEP recommended that the Government consider restricting use of land, particularly for agriculture.¹² UNEP also noted that, while the Government has introduced some measures “to improve the monitoring and management of liquid wastes from ships in the ports, access controls to the municipal waste disposal site at Akouédo ... remain somewhat weak”.¹³ The report recommends that the Government undertake a further review of its “operating procedures for hazardous waste management and to ensure that adequate chain of custody procedures are enforced to prevent such events from occurring again”.¹⁴

PUBLIC HEALTH MONITORING AND ENVIRONMENTAL CONCERNS

UNEP’s finding that pollution levels did not exceed national or international standards requiring further clean-up at any of the other sites is reassuring and the publication of the report constitutes an important first step in helping to address people’s fears about ongoing contamination at the dumpsites. UNEP makes a point of noting, however, that this does not “preclude that health impacts from their original exposure to the wastes in 2006 are still affecting communities”.¹⁵

Despite the various clean-up initiatives that took place between September 2006 and November 2015, the UNEP report highlights that people living in Abidjan continue to be concerned about the possible health and environmental impacts of the toxic waste dumping.¹⁶ For UNEP, the question of whether those affected by the dumping continue to suffer health impacts is “critical”, particularly given that the Government of Côte d’Ivoire has never monitored the victims to check for long-term health effects.¹⁷

Consequently, UNEP strongly recommended that the Government of Côte d’Ivoire “establish a public health monitoring programme ... to understand and address possible long-term health effects of exposure to the

⁷ UNEP, *Environmental Audit*, p.95.

⁸ UNEP, *Environmental Audit*, p.95.

⁹ UNEP, *Environmental Audit*, p.95.

¹⁰ UNEP, *Environmental Audit*, p.95.

¹¹ UNEP, *Environmental Audit*, p.95.

¹² UNEP, *Environmental Audit*, p.96.

¹³ UNEP, *Environmental Audit*, p.96.

¹⁴ UNEP, *Environmental Audit*, p.96.

¹⁵ UNEP, *Environmental Audit*, p.96.

¹⁶ UNEP, *Environmental Audit*, p.13.

¹⁷ UNEP, *Environmental Audit*, p.96.

toxic wastes in 2006”.¹⁸ UNEP’s recommendation is in line with Amnesty International’s calls for the Government of Côte d’Ivoire to “[d]evelop and implement a plan for the long-term health monitoring of individuals affected by the dumping”.¹⁹

The UNEP report also warned that “environmental ‘hotspots’ are developing in Abidjan in the absence of effective surveillance”.²⁰ Although there have been no major environmental or public health impacts as a result of these hotspots, there could be in the future in a fast-growing city such as Abidjan. UNEP also recommended that the Government “restructure CIAPOL and provide it with additional resources to ensure that it can respond to current environmental challenges”.²¹

¹⁸ UNEP, <https://www.unenvironment.org/news-and-stories/press-release/un-environment-releases-independent-audit-sites-affected-toxic-waste> (accessed 2 March 2018)

¹⁹ Amnesty International, *A Toxic Legacy: The Case for a Medical Study of the Long-Term Health Impacts of the Trafigura Toxic Waste Dumping*, 2018, p.26.

²⁰ UNEP, *Environmental Audit*, p.96.

²¹ UNEP, *Environmental Audit*, p.96.

CONTENTS

EXECUTIVE SUMMARY	4
METHODOLOGY	6
1. THE DUMPING OF THE TOXIC WASTE AND ITS IMPACT	7
1.1 THE DUMPING OF THE TOXIC WASTE	7
1.2 HEALTH IMPACT	8
1.3 ENVIRONMENTAL IMPACT	11
2. THE CASE FOR A LONG-TERM HEALTH STUDY	19
2.1 LEGACY OF FEAR	19
2.2 OBLIGATIONS UNDER INTERNATIONAL HUMAN RIGHTS LAW	22
3. CONCLUSION AND RECOMMENDATIONS	25
3.1 CONCLUSION	25
3.2 RECOMMENDATIONS	25

EXECUTIVE SUMMARY

“We would like to know the contents of the waste and what degree of danger we are exposed to. ... If someone is the victim of something, they have the right to know what the damage is and to know the health consequences in the short and long-term.”

– Gisele Kone, Teacher, Djibi Village, Abidjan, July 2016

On 20 August 2006, the people of Abidjan in Côte d’Ivoire woke to find that foul-smelling, toxic waste had been dumped at multiple locations across their city. The smell engulfed Abidjan. In the days and weeks that followed the dumping, thousands of people streamed into the city’s medical facilities, complaining of nausea, headaches, breathing difficulties, stinging eyes and burning skin. By the end of October 2006, more than 100,000 people had been treated according to official records. The authorities reported that between 15 and 17 people died. The dumpsites required extensive clean-up and decontamination.

To this day people in Abidjan live in fear of the long-term impacts of the dumping on their health and the health of their children, for two simple reasons – a lack of action and a lack of information. No one has ever checked up on or monitored the health of affected communities, or fully assessed any long-term health risks of exposure to the chemicals in the toxic waste. Fear has filled this gap – sparked by a lack of information about what exactly was in the waste as well as people’s belief that the dumpsites are still contaminated and that they are still ill because of the dumping.

Eleven years on, we finally have an opportunity to address the toxic legacy of this disaster.

The United Nations Environment Programme (UNEP) will shortly release the results of their July 2016 environmental audit of the various dumpsites, undertaken at the request of the Côte d’Ivoire government. This is an important first step

in helping to address people’s fears about ongoing contamination at the dumpsites.

An equally important – and long overdue – second step is identifying and addressing any long-term health impacts. Affected communities, Amnesty International and United Nations experts have consistently called on the Côte d’Ivoire government to take this step. At the Côte d’Ivoire government’s request, UNEP and the World Health Organization (WHO) have now organised a meeting of public health experts to analyse information on the health impacts of the dumping and to consider the need for a long-term health study.

This briefing makes the health and human rights case for that study. It summarizes the story of this disaster, how it affected people’s health and their environment, and the impact it has on the people of Abidjan to this day. It outlines how the dumping violated the right to health of the people of Abidjan and why relevant governments still have an obligation to remedy that violation. It also makes recommendations on what the study could involve, how it could be implemented and how any long-term health impacts could be monitored and addressed.

THE DUMPING OF THE TOXIC WASTE AND ITS IMPACT

Trafigura, a multinational commodities trader, produced the toxic waste that was dumped around Abidjan in August 2006. The waste included a mix

of spent caustic (a sodium hydroxide solution) and coker naphtha (a high-sulphur, dirty by-product of crude oil refining). Trafigura had tried and failed to dispose of the waste in various places, including The Netherlands, before it paid a local company in Abidjan just under US\$17,000 to dispose of the waste. The local company ended up dumping the waste illegally in 18 locations around Abidjan, close to homes, workplaces and schools.

The impact on people's health was immediate, triggering widespread panic and a medical emergency at the height of which nearly 8,000 people sought treatment in just one day. The dumpsites required extensive clean-up and decontamination, in a complex operation that continued until November 2015. Despite this, concerns remain as to whether the dumpsites have been completely de-contaminated.

Trafigura has never disclosed all the information it holds about the composition of the waste. Tests conducted by Dutch authorities in Amsterdam did, however, reveal that the waste included various chemicals known to be hazardous to health including sodium hydroxide, mercaptides, sulphides and benzene. Additionally, a toxicologist has advised Amnesty International that the mercaptides and sulphides in the waste may have converted to hazardous mercaptans and hydrogen sulphide if the pH of the waste (or parts of it) fell below a certain level at any of the dumpsites.

THE CASE FOR A LONG-TERM HEALTH STUDY

The dumping violated the right to health of the people of Abidjan and had a devastating impact on their health and environment. Victims suffered a range of serious health issues consistent with the likely effects of exposure to the chemicals thought to be in the waste, including respiratory problems, severe abdominal pain and digestive problems. One medical study of the short and medium-term effects on respiratory function of exposure to the chemicals in the waste, found a strong probability

of a causal relationship between prolonged exposure and an increase in the frequency of bronchial hyper-responsiveness (marked by excessive narrowing of the bronchial and recognised as a hallmark of chronic asthma). The study also raised concerns about longer-term cancer risks.

Despite this, no study or monitoring process has ever been put in place to assess the long-term health risks of the dumping of the toxic waste.

This lack of action and information has left a legacy of fear in Abidjan that still needs to be addressed. Amnesty International has spoken to people who live or work near the dumpsites at various times between 2009 and 2016. They have consistently expressed concerns about the long-term impacts of the dumping on their health and the health of their children, for three very real and inter-related reasons: people do not know exactly what was in the waste; they are concerned about the completeness of the clean-up operation (which in turn creates a fear that they are still being exposed to the chemicals in the waste); and many believe that they are still ill because of the dumping.

This lack of action and information also means that, to this day, the violation of people's right to health has never been fully remedied. The failure to monitor the health of victims, and to fully identify and address any long-term health risks, has denied people a meaningful and vital aspect of their right to an effective remedy. The people of Abidjan have a right to know if exposure to the chemicals in the waste could cause long-term health issues and, if so, what they are and how they can be treated.

There are undoubtedly challenges in establishing if exposure to the chemicals in the waste has caused or could cause long-term health impacts. Trafigura itself denies responsibility for the dumping and maintains that it believed the local company it hired to dispose of the waste in Abidjan would do so safely and lawfully. It also strongly denies that the dumping could have had any serious or long-term health impacts. But unless and until any actual and potential long-

term impacts are comprehensively assessed and addressed, people in Abidjan will continue to live in fear of the toxic legacy of the dumping.

As such, this briefing makes various recommendations to ensure that any long-term health impacts are finally assessed and addressed. This includes:

- Calling on public health experts at the meeting organised by UNEP and the WHO to recommend that the Côte d'Ivoire government immediately put in place a study to comprehensively assess any long-term impacts of the dumping on health. This study should aim to identify any long-term impacts and ongoing risks of exposure to the chemicals in the waste. It should also include an epidemiological study.
- Calling on the Côte d'Ivoire government to immediately commission this study, and make specific requests for technical and financial assistance from other governments and international organisations where necessary.
- Calling on the Côte d'Ivoire government to develop and implement a plan for long-term health monitoring of individuals affected by the dumping, and to ensure the availability of accessible, affordable and quality health services for people whose health is affected now or in the future.
- Calling on the government of The Netherlands to prioritize the funding of this study and health monitoring, and for other governments to engage with and support the Côte d'Ivoire government to carry out the recommendations in this briefing.

METHODOLOGY

The information in this briefing is based on *The Toxic Truth*, a report published by Amnesty International and Greenpeace in September 2012 following a three year investigation into the dumping and its aftermath,¹ desk-based research, and interviews conducted by Amnesty International in Abidjan from 6 to 12 December 2013 and from 7 to 15 July 2016.

In December 2013, Amnesty International travelled to Abidjan to follow-up with the Côte d'Ivoire government on the recommendations in *The Toxic Truth*. Researchers met with officials from the Ministry of Health, Ministry of Transport and Ministry of Hygiene, Environment and Sustainable Development. Researchers visited six dumpsites in Akouédo and Vridi and interviewed nine residents affected by the dumping. Researchers also interviewed two medical personnel, one lawyer and the head of one victims' association.

In July 2016, Amnesty International travelled to Abidjan to assess the ongoing impacts of the dumping ten years on. Researchers visited six dumpsites in Akouédo, Djibi, Dokui and Abobo and interviewed 40 residents affected by the dumping. Researchers also interviewed five medical personnel, one lawyer, one journalist and the heads of five victims' associations. Researchers met with officials from the Ministry of Health, the Ministry of Hygiene, Environment and Sustainable Development and the United Nations Environment Programme (UNEP). Researchers spent one day observing UNEP's environmental audit work.

1. Amnesty International and Greenpeace, *The Toxic Truth: About a Company Called Trafigura, a Ship Called The Probo Koala, and the Dumping of Toxic Waste in Côte d'Ivoire* (Index: AFR 31/002/2012), www.amnesty.org/en/documents/AFR31/002/2012/en/ (accessed 13 September 2017).

1. THE DUMPING OF THE TOXIC WASTE AND ITS IMPACT

1.1 THE DUMPING OF THE TOXIC WASTE

On the night of 19-20 August 2006 over five hundred thousand litres of toxic waste were dumped around Abidjan, the economic capital of Côte d'Ivoire. Trafigura, an international commodities trader, had made the waste by using caustic soda to "wash" several cargoes of coker naphtha on a ship at sea. Coker naphtha is a dirty by-product of refining crude

oil. This particular coker naphtha had very high levels of mercaptans – organic compounds containing sulphur that tend to have a very strong odour.²

The coker naphtha was available at a low price and Trafigura estimated that it could make a profit of US\$7 million on each cargo, by blending it with better quality gasoline and selling it as petrol in West Africa and other markets.³ Before doing so, Trafigura needed to reduce the smell of the naphtha and therefore its sulphur content.⁴

Trafigura chose to do this by "caustic washing".⁵ This industrial process – which had never been tried at sea before – involves mixing caustic soda (sodium hydroxide) with the naphtha.⁶ This causes a chemical reaction that extracts the mercaptans into a resulting hazardous and highly-odorous waste product, known as "spent caustic".⁷ The waste on board the ship included spent caustic and the remains of the coker naphtha.⁸



A basin in the residential area of Plateau Dokui. Toxic waste collected here, having travelled downstream from the "Coco Service" dumpsite about 2km upstream (UNDAC site reference 2.1). July 2016
© Amnesty International

2. Internal Trafigura emails disclosed as Rec#7696 of Exhibit MJD2 to the Fourth Witness Statement of Martyn Jeremy Day, 20 October 2008 (hereafter Exhibit MJD2), *Yao Essaie Motto & Others v Trafigura Limited and Trafigura Beheer BV in the High Court of Justice, Queen's Bench Division, Claim No. HQ06X03370* (hereafter *Motto v Trafigura*).
3. Internal Trafigura emails disclosed as Rec#5893 and Rec#5914 of Exhibit MJD2, *Motto v Trafigura*.
4. Trafigura, *Trafigura & The Probo Koala*, p. 23 ("What are mercaptans – and why were they treated anyway?"), www.trafigura.com/images/probo-koala/trafigura-and-the-probo-koala.pdf (accessed 15 September 2017).
5. Internal Trafigura emails disclosed as Rec#6580 and Rec#7201 of Exhibit MJD2, *Motto v Trafigura*.
6. Decision of the District Court of Amsterdam, *In the case of Trafigura Beheer B.V. (Public Prosecutor's Office No. 13/846003-06)*, 23 July 2010 (English translation), para. 5.4 (hereafter *Dutch Prosecution Decision*).
7. Honeywell UOP, *Gas & LPG Treating*, www.uop.com/processing-solutions/refining/gas-lpg-treating (accessed 15 September 2017).
8. Netherlands Forensic Institute, Expert Report: *Odour Incident, APS Amsterdam*, 29 January 2007 (English translation), p. 11 (hereafter *NFI Report*).

When Trafigura made the waste, it knew that it was hazardous but did not know how to dispose of it safely.⁹ The company tried and failed to dispose of the waste in several locations before Côte d'Ivoire, including The Netherlands and Nigeria.¹⁰ When Trafigura tried to dispose of the waste in Amsterdam in July 2006, by disguising it as waste produced during the ship's normal operations, it triggered an environmental incident after people in the area complained of the smell and experienced nausea, dizziness and headaches.¹¹

Tests revealed that the waste was highly contaminated and needed specialist treatment.¹² Despite this, Trafigura rejected an offer to treat the waste in a specialist facility in The Netherlands for one euro per m³ of waste (which would then have equalled around US\$695,000 for the total amount of waste on board)¹³ and Dutch authorities allowed Trafigura to reload the waste back onto the ship.¹⁴

The toxic waste was finally dumped illegally in Côte d'Ivoire by a local company that Trafigura hired to dispose of it for just under US\$17,000 – a much lower price than quoted in The Netherlands, even taking into account likely price differences between Western Europe and West Africa.¹⁵ The waste ended up in 18 known locations around Abidjan, close to houses, workplaces, schools, fields of crops and the city prison.¹⁶

1.2 HEALTH IMPACT

“This is the biggest health catastrophe that Côte d'Ivoire has known.”

– Dr. Jean Denoman, then Deputy General Director of Health for the Côte d'Ivoire Ministry of Health and Public Hygiene¹⁷

On the morning of 20 August 2006, residents around Abidjan woke up to a strong and all-pervading smell that they consistently described as suffocating, like a mix of rotten eggs, garlic, gas and petroleum.¹⁸

The impact on health was immediate. People began to stream into Abidjan's medical facilities, complaining of a combination of similar health problems such as breathing difficulties, headaches, and stinging skin, eyes and noses. At that time, medical staff had noticed an extremely bad smell near their homes or workplaces but were not aware that toxic waste had been dumped around the city.¹⁹

On 23 August, the Ministry of the Environment informed the Minister of Health of the dumping.²⁰ The Minister immediately initiated a medical emergency response, the scope of which expanded as more dumpsites were discovered and more people sought treatment.²¹ The Ministry of Health increased the number of designated treatment facilities from two hospitals to 32 medical centres and 20

9. Internal Trafigura emails disclosed as Rec#7696 and Rec#5914 of Exhibit MJD2, *Motto v Trafigura*.

10. Amnesty International and Greenpeace, *The Toxic Truth*, Chapter 3.

11. Dutch Prosecution Decision, paras. 5.15-5.18; Amnesty International and Greenpeace, *The Toxic Truth*, p. 37-38.

12. Email to Trafigura disclosed as Rec#4696 of Exhibit MJD2, *Motto v Trafigura*; Dutch Prosecution Decision, para. 5.16.

13. Euros converted to US Dollars at the mid-market exchange rate as of 3 July 2006 (the date of the email), as reported on www.xe.com/currencytables, and on the basis that the volume of waste on board the ship then amounted to 544m³.

14. Email from Trafigura disclosed as Rec#4696 of Exhibit MJD2, *Motto v Trafigura*; Dutch Prosecution Decision, paras. 5.28-5.29.

15. Letter from Compagnie Tommy, 18 August 2006, disclosed as Rec#4477 of Exhibit MJD2, *Motto v Trafigura*. Calculation of US\$17,000 based on figures provided in an internal Trafigura email of 25 August 2006 disclosed as Rec#9417 of Exhibit MJD2, *Motto v Trafigura*.

16. National Commission of Enquiry, *Rapport de la Commission Nationale d'Enquete sur les Dechets Toxiques Deverses dan le District d'Abidjan*, 15 September - 15 November 2006, p. 47-48; Greenpeace interviews with drivers, May 2010.

17. Witness Statement of Jean Denoman, 2 December 2008, *Motto v Trafigura* (hereafter Jean Denoman, *Witness Statement*), para. 37.

18. Amnesty International interviews with: Angèle N'Tamon, Abidjan, 15 February 2009; Françoise Kouadio, Abidjan, 18 February 2009; Jerome Agoua, Abidjan, February 2009 and by telephone, 6 July 2011; Dr. K., by telephone, June 2011. Also see Witness Statement of Dr. Tiemoko Bleu, 4 December 2008, *Motto v Trafigura*, para. 5 (hereafter Dr. Bleu, *Witness Statement*).

19. Dr. Bleu, *Witness Statement*, paras. 5-7; Witness Statement of Dr. K., 30 July 2008, *Motto v Trafigura*, paras. 2-3 (hereafter Dr. K., *Witness Statement*); Witness Statement of Dr. Kouame N'Guessan Michel Bouaffou, 4 December 2008, *Motto v Trafigura*, paras. 3-6 (hereafter Dr. Bouaffou, *Witness Statement*).

20. Ministère de la Santé de L'Hygiène Publique, *Bilan Partiel de la gestion du volet sanitaire de la crise des déchets toxiques par le ministère de la santé et de l'hygiène publique*, October 2006, p. 8 (hereafter Ministry of Health, *Bilan Partiel*), attached to Jean Denoman, *Witness Statement*.

21. Jean Denoman, *Witness Statement*, para. 4.

mobile medical units.²² At the peak of the medical emergency, around the middle of September, nearly 8,000 people sought treatment in just one day.²³

Due to the scale of the crisis, the Côte d'Ivoire government had to rely on assistance from the Red Cross and the World Health Organization (WHO), as well as a UN Disaster Assessment and Coordination (UNDAC) team that undertook a mission to Abidjan in the middle of September 2006.²⁴

The medical response officially finished at the end of October 2006.²⁵ By that time health centres had recorded over 107,000 consultations, 69 hospitalisations and 10 deaths.²⁶ However, the actual number of people who sought treatment is likely to be higher, as records are incomplete²⁷ and not everyone went to a designated health facility.²⁸ Based on an analysis of consultation records, the Ministry of Health reported that 33.6% of those who sought treatment were 19 years old or younger, with 11.6% being less than five years old.²⁹



Cassava growing at one of the sites where toxic waste was dumped in August 2006, at the domestic waste dump at Akouédo, Abidjan (UNDAC site reference 1.1). July 2016 © Amnesty International

22. *Plan stratégique national 2006-2009 de lutte contre les déchets toxiques du Probo Koala et leur impact sur l'environnement et la santé de la population*, December 2006, p. 5-6, www.dechetstoxiques.gouv.ci/pdf/plan-strategique-final.pdf (accessed 13 September 2017).
23. Report of the *Institut National d'Hygiène Publique*, p. 25 (hereafter INHP, Report).
24. International Federation of Red Cross and Red Crescent Societies, *DREF Bulletin: Côte d'Ivoire Health Hazard Final Report*, 11 July 2007, www.ifrc.org/docs/appeals/06/MDRCIO01fr.pdf; UN News Service, *Côte d'Ivoire: UN sends team to help coordinate response to deadly toxic waste crisis*, 11 September 2006, www.un.org/apps/news/story.asp?NewsID=19790#.WbkSu7KGO00; World Health Organization, *Chemical dump in Côte d'Ivoire: WHO providing public health support*, 20 September 2006, www.who.int/mediacentre/news/notes/2006/np26_update/en/; United Nations Disaster Assessment & Coordination, *Côte d'Ivoire Urban Hazardous Waste Dumping: 11-19 September 2006*, docs.unocha.org/sites/dms/Documents/UNDAC_Ivory_Coast_Report_2006.pdf (all accessed 13 September 2017).
25. Hôpital Militaire d'Abidjan, *Bilan de Gestion Des Victims de Dechets Toxiques par l'Hôpital Militaire d'Abidjan*, 30 November 2006, p. 2 (hereafter HMA, *Bilan de Gestion*), attached to Dr Bleu, *Witness Statement*.
26. Ministry of Health, *Bilan Partiel*, p. 5.
27. Standardized consultation forms (*fiches*) were only created at the end of August and, in some medical facilities, only came into operation at the beginning of September. A doctor involved in the medical response told Amnesty International that this meant some of the most ill were not recorded on the forms and that forms were sometimes not completed in full or at all when doctors were under pressure to see many patients or when the medical centres ran out of forms. Amnesty International interview with Dr. K, by telephone, June 2011. Also see Amnesty International and Greenpeace, *The Toxic Truth*, p. 54.
28. Some went to private clinics, were unable to attend the treatment centres or may have preferred traditional healers. Witness Statement of Dr. A, 2 December 2008, *Motto v Trafigura*, paras. 16 and 18 (hereafter Dr. A, *Witness Statement*); Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS), *Results of Fieldwork conducted between 9 October 2006 and 28 December 2006: Document 2: Epidemiological Section*, October 2007, p. 31-32 (hereafter CSRS, *Fieldwork Results*).
29. Ministry of Health, *Bilan Partiel*, p. 30.

COMMONLY REPORTED SYMPTOMS IN 2006³⁰

NEUROLOGICAL	Cephalalgia (headache) which some doctors noted appeared quickly after inhaling the odours and could occur along with dizziness and blackouts.
RESPIRATORY / PULMONARY	Respiratory symptoms were very frequently noted, and included dyspnoea (difficult or laboured breathing) resembling asthma attacks, coughs, thoracic pain and more rarely haemoptysis (coughing up of blood or bloodstained sputum).
CUTANEOUS	Stinging sensation on the skin, cutaneous pruritus (itching), various forms of cutaneous eruptions, severe itching.
DIGESTIVE PROBLEMS	Bloating, abdominal and epigastric pain, nausea, diarrhoea. Some people living close to the dumping site also presented with hematemesis (vomiting blood) or melaena (black tarry faeces, normally as a result of internal bleeding).
EAR, NOSE AND THROAT (ENT)	Rhinorrhoea (runny nose), dysphagia (swallowing problems), epistaxis (nose bleed).
OCULAR	Stinging or burning eyes, red eyes and ocular pruritus (itching eyes), purulent lachrymal secretions (pus-like discharge from tear ducts), blurred vision and loss of visual acuity, conjunctivitis.

OTHER REPORTED SYMPTOMS IN 2006³¹

CARDIO VASCULAR	These were considered rarer but doctors also noticed cardiac symptoms such as palpitations and tachycardia as well as an increase in blood pressure.
GYNAECOLOGICAL	<p>Doctors stated that they treated some serious gynaecological cases, including pregnant women who experienced severe pelvic and abdominal pain. A few doctors also noted cases of miscarriages, which they believed may have been linked to exposure to the waste, since these involved women who had had regular gynaecological consultations at the medical facility prior to the dumping, and whose pregnancies had been progressing completely normally up until their exposure.</p> <p>Women interviewed by Amnesty International also described experiencing pain and changes in their menstrual cycles.</p>

PREVALENCE OF SYMPTOMS AMONGST PATIENTS

GROUP OF SYMPTOMS ³²	NUMBER OF PATIENTS (N = 98,108)	PERCENTAGE (%)
General or neurological symptoms	72,062	73.4
ENT or pulmonary symptoms	66,853	68.1
Digestive symptoms	54,845	55.9
Cutaneous symptoms	27,999	28.5
Ocular symptoms	17,350	17.7

30. Based on: HMA, *Bilan de Gestion*, p. 7; Dr. K, *Witness Statement*, paras. 37-46; Ministry of Health, *Bilan Partiel*, p. 24-25.

31. Amnesty International interviews with: Dr. Bleu, by telephone, June 2011; Dr. K, by telephone, June 2011; and focus group of women in Djibi village, 15 February 2009. See also HMA, *Bilan de Gestion*, p. 7; Dr. K, *Witness Statement*, para. 34; Dr. A, *Witness Statement*, para. 13; *Witness Statement* of Dr. Danielle Obodou Ipou, *Motto v Trafigura*, para. 13.

32. INHP, Report, Table XII, Section 5.3.4.1. This table shows the prevalence of symptoms amongst patients, based on an analysis of survey forms completed between August 2006 and January 2007.

1.3 ENVIRONMENTAL IMPACT

The official clean-up and decontamination process began on 17 September 2006, almost four weeks after the dumping took place.³³ It ended over 9 years later in November 2015, although as outlined below there are concerns as to whether the dumpsites have been completely decontaminated.³⁴

The sites affected by the dumping required extensive clean-up and decontamination, in what has been a complex process. Ranging from roadsides, to a domestic waste dump, to streams and lagoons, each site had different characteristics and required specific cleaning methods adapted to the site's features.³⁵ In some cases the sites consisted of liquid waste, while in others (such as where the waste had seeped into the ground) they consisted of solid waste.

A number of companies were involved in the remediation process. Between September 2006 and February 2007, a French company called Tredi removed 9,322 tonnes of contaminated material (solids and liquids) from 15 of the 18 identified sites around Abidjan, most of which was exported to France for incineration.³⁶ The Côte d'Ivoire government originally hired Tredi to remove 2,500 tonnes of waste and polluted soil, but it became clear as work progressed that the volume of polluted

material was far greater.³⁷ A spokesperson for Tredi stated in October 2007 that more than 6,000 tonnes of heavily contaminated material was still present in Abidjan.³⁸

In April 2007, the Côte d'Ivoire government and Trafigura hired another French company called Burgeap to audit the work undertaken by Tredi and to identify known and potential dumpsites that may still require decontamination.³⁹ For these purposes, Burgeap planned to take samples at five of the known dumpsites as well as seven potential dumpsites. At the time, these potential dumpsites included the basin at Dokui Plateau downstream from the "Coco Service" dumpsite (see photo on page 7), as nearby residents were still complaining of the smell, as well as sites near the city prison and the police school.⁴⁰

The Côte d'Ivoire government and Trafigura subsequently agreed to scale back this work and prioritize just two known dumpsites, for reasons that have not been disclosed. Burgeap therefore investigated and took samples at two dumpsites by a main road into Abidjan called the Route d'Alépé, on the outskirts of Djibi village.⁴¹ Following its investigation, and primarily because of the persistent smell and the sites' proximity to Djibi village, Burgeap recommended treating the polluted soil by using an on-site biodegradation process.⁴²

33. Séché environnement, *Déchets toxiques à Abidjan: plusieurs semaines de travaux nécessaires*, 21 September 2006, www.groupe-seche.com/documents/news/uploads/18_ACTU-ABIDJAN.pdf (accessed 13 September 2017).

34. Cheickna Dabou, *Côte d'Ivoire: Déchets toxiques - Après la dépollution, des victimes exigent une consultation médicale*, All Africa, 9 November 2015, fr.allafrica.com/stories/201511100449.html (accessed 13 September 2017).

35. Information confidentially obtained by Greenpeace Netherlands from a source closely involved in the clean-up process. See also UN Office for the Coordination of Humanitarian Affairs, *Côte d'Ivoire: Toxic waste pollution crisis OCHA Situation Report No. 5*, 14 September 2006, reliefweb.int/report/c%3%B4te-divoire/c%3%B4te-divoire-toxic-waste-pollution-crisis-ocha-situation-report-no-5, para. 9 (accessed 13 September 2017).

36. Séché environnement, *Déchets toxiques de Côte d'Ivoire: transport et traitement*, 12 February 2007, www.groupe-seche.com/documents/news/uploads/23_COMM-DECHETS-IVOIRE-12-02-2007.pdf (accessed 13 September 2017); Burgeap, *Environmental Audit pursuant to clause 2.2 of Heads of Agreement signed on 13/02/07 between the Parties, the Ivory Coast State and Trafigura: Audit Report – phase 1*, 7 June 2007, para. 2.2.4 (hereafter Burgeap, Phase 1 Report). Section 2.2.4 of the Burgeap report lists 15 sites from which waste was removed by Tredi. It appears that one of those sites is mistakenly labelled as ABO7 rather than ABO4.

37. Burgeap, *Phase 1 Report*, para. 2.2.1.

38. A spokesperson for Tredi on a programme broadcast on Nova Television in The Netherlands on 18 October 2007 commented that: "There is definitely more than 6,000 tonnes of heavily polluted material. And that the new government has chosen a new approach."

39. Burgeap, *Phase 1 Report*, para. 2.1.

40. Burgeap, *Phase 1 Report*, paras. 2.2.3.2 and 2.3.2.

41. Burgeap, *Environmental Audit pursuant to clause 2.2 of Heads of Agreement signed on 13/02/07 between the Parties, the Ivory Coast State and Trafigura: Dumping sites on the Alépé Road, commune of Abobo, Phase 2 (paragraphs 1 to 4) – Supplementary investigations and Phase 3 (paragraph 5) – Recommendations for rehabilitation*, 20 March 2008, paras. 2.2.1 and 2.2.4 (hereafter Burgeap, *Phase 2 and 3 Report*). This process was also outlined on page 18 of an earlier draft of this report, dated 25 August 2007 (on file with Amnesty International).

42. When taking samples in July 2007, Burgeap noted "strong smells of garlic characteristic of sulphurous slops [waste]" that became greater as they dug boreholes to take samples. Burgeap, *Phase 2 and 3 Report*, p. 10, 17 and 18.

In October 2007, the Côte d'Ivoire government hired a Canadian company called Biogénie to carry out the on-site biodegradation process.⁴³ As an initial step Biogénie packed the polluted soil into big bags and put them onto pallets at the site, in line with recommendations by Burgeap (see “The Case of Djibi Village” on page 21).⁴⁴ However Biogénie only began treating the soil in March 2010 and, following a break in November 2010 due to post-election violence, resumed operations in November 2011.⁴⁵ On 7 November 2015, over 9 years after the

dumping, the Côte d'Ivoire government announced that the last known dumpsites (on the Route d'Alépé) had been decontaminated.⁴⁶ At the request of the Côte d'Ivoire government, the United Nations Environment Programme (UNEP) performed an environmental audit of all of the known dumpsites in July 2016 to check if they had actually been decontaminated. UNEP took samples of air, soil, water, sediment, shellfish and vegetation.⁴⁷ It is due to publish its findings in early 2018.



Representatives from the Centre Ivoirienne AntiPollution (CIAPOL) taking samples at one of the dumpsites during the UNEP audit. July 2016 © Amnesty International

43. Trafigura, *The Probo Koala Case in 12 Questions: Have the “dump sites” been fully remediated?*, www.trafigura.com/resource-centre/probo-koala/ (accessed 23 September 2017).
44. Burgeap, Phase 2 and 3 Report, p. 20. Amnesty International researchers observed big bags of contaminated material on pallets during a site visit in February 2009.
45. Cote d'Ivoire Ministry of the Environment: *Déchets toxiques: La dépollution des sites de déversement en cours*, MINEDD MAG / N° 001- Juin 2011-Décembre 2011, www.environnement.gouv.ci/img/1339579950Journal_MINEDD_MAG_6_10.pdf; and *Sites contaminés par les déchets toxiques du Probo-Koala: Les derniers sites dépollués remis au Ministre Rémi Allah-Kouadio*, 6 November 2015, www.environnement.gouv.ci/actualite.php?rd=277 (both accessed 13 September 2017).
46. Cheickna Dabou, *Côte d'Ivoire: Déchets toxiques - Après la dépollution, des victimes exigent une consultation médicale*, All Africa, 9 November 2015, fr.allafrica.com/stories/201511100449.html (accessed 13 September 2017).
47. United Nations Environment Programme, *UNEP Assesses Sites Impacted by “Probo Koala” Toxic Waste Dumping in Abidjan, Côte d'Ivoire*, 14 July 2016, www.unep.org/newscentre/unesp-assesses-sites-impacted-probo-koala-toxic-waste-dumping-abidjan-c%C3%B4te-divoire (accessed 5 October 2017).

THE CHEMICALS IN THE TOXIC WASTE AND LIKELY EFFECTS OF EXPOSURE

There is no definitive information as to the exact chemical composition of the waste dumped in Abidjan. Trafigura has never published all the information it holds about the composition of the waste despite requests from Amnesty International.⁴⁸ In documents submitted in legal proceedings related to the disaster, Trafigura has stated that the “best available evidence” of the composition of the waste is an analysis produced by the Netherlands Forensic Institute (NFI) in January 2007, based on samples taken when Trafigura tried to dispose of the waste in Amsterdam in July 2006.⁴⁹ Using NFI’s analysis as a basis, Trafigura has said in those documents that the likely chemical composition of the aqueous phase (i.e., the spent caustic) and hydrocarbon phase (i.e., the remains of the coker naphtha) of the waste is as set out below.⁵⁰

Note: The NFI samples were taken six weeks before the dumping in Abidjan and the sampling method used would not necessarily have collected sediment that may have accumulated at the bottom of the ship’s waste tanks.⁵¹

CHEMICAL	% OF WASTE	WEIGHT
AQUEOUS PHASE⁵²		
Sodium Hydroxide (NaOH)	10%	37.9 tons
Total Sulphur (S)	6.80%	25.7 tons
Mercaptan Sulphur (Ethyl and Methyl Sodium Mercaptides as S)	3.34%	12.7 tons
Thiophenols	0.16%	0.6 tons
Phenols, including Cresols	4.80%	18.2 tons
Inorganic Sulphur (Sulphide and Bi-Sulphide as S) ⁵³	0.50%	1.9 tons
Cobalt Phthalocyanine Sulphonate	4 ppm added	1516 grams
Catalysts (as Co)	1.3 ppm measured	492 grams
Mercury	0.91 ppm	345 grams
Zinc	2.7 ppm	1023 grams
Copper	1.8 ppm	682 grams
Strontium	0.42 ppm	159 grams

48. See Amnesty International and Greenpeace, *The Toxic Truth*, p. 179; Amnesty International letter to Trafigura, 13 June 2016.

49. Reply of Trafigura, *Trafigura Limited v British Broadcasting Corporation* in the UK High Court of Justice, Queen’s Bench Division, Claim No. HQ09X02050, 20 November 2009, Summary of Reply, para. 5. (hereafter Trafigura Reply, *Trafigura v BBC*).

50. Trafigura Reply, *Trafigura v BBC*, Appendix 1.

51. For more information see Amnesty International and Greenpeace, *The Toxic Truth*, p. 72 and 209.

52. Trafigura states that the weight is based on 379 metric tonnes (344.8m³) aqueous waste at a density of 1.1 for 10% caustic.

53. The NFI report labels the 0.5% as hydrogen sulphide. Trafigura gives it a different description in this list as NFI identified the hydrogen sulphide in a mixture that had been acidified.

HYDROCARBONS PHASE ⁵⁴		
Hydrocarbons C5 to C11	Approx 98%	Approx 135 tons
Heavy Hydrocarbons C14 to C40, estimated from Tredi Analysis	0.45%	0.62 tons
Normal Alkanes	29.1%	39.9 tons
Branched Alkanes	17.2%	23.6 tons
Unsaturated Compounds	36.2%	49.6 tons
Cyclic Alkanes	10.9%	14.9 tons
Aromatics, of which:	6.2%	8.5 tons
C2 Alkyl Benzenes	1.7%	2.3 tons
C3 Alkyl Benzenes	0.9%	1.2 tons
C4 Alkyl Benzenes	0.1%	0.14 tons
Total Sulphur mainly as Diethyl and Methyl Propyl Disulphides (measured as S)	1.3%	1.8 tons
Mercaptan Sulphur (S)	0.0095%	0.13 tons
Organo Chlorine (ex Main VII)	2 ppm	274 grams

The known chemicals in the waste therefore included sodium hydroxide, mercaptides, sulphides and organic chemicals such as benzene, xylene and toluene. Having reviewed the publicly available evidence about the waste, a toxicologist provided Amnesty International and Greenpeace in 2010 with the following information on the likely impacts of exposure to these chemicals, by contact, inhalation or otherwise.⁵⁵ The toxicologist also advised that the mercaptides and sulphides in the waste may have converted to mercaptans and hydrogen sulphide if the pH of the waste (or parts of it) fell below a certain level at any of the dumpsites:

- Sodium hydroxide (i.e., the caustic soda):** The likely effects of inhaling sodium hydroxide aerosols are a burning sensation, sore throat, cough, laboured breathing and shortness of breath. Symptoms may be delayed. Contact with the skin will result in the skin becoming red and painful and there may be serious skin blisters. Exposure of the eyes will result in them becoming red and painful and there may be blurred vision and severe deep burns. Any ingestion will result in a burning sensation and abdominal pain with the individual going into shock and possibly collapsing.
- Mercaptans / mercaptides:** As noted above, the publicly available information has limitations, but there is evidence to suggest that the pH of some of the dumped waste fell below 11, which would have resulted in a portion of the mercaptides being converted into mercaptans and being released into the air.⁵⁶ The likely effects

54. Trafigura states that the weight is based on 137 metric tonnes (183m3) hydrocarbon waste at a density of 0.75 measured in Abidjan by CIAPOL on 22 August 2006 (from a sample drawn on 21 August 2006).

55. Amnesty International and Greenpeace consulted Alastair Hay, Professor in Environmental Toxicology, University of Leeds.

56. In court documents, Trafigura provided evidence to indicate that one measurement of dumped waste at Akouédo on 21 August 2006 had a pH value of 10.5. Trafigura also mention a report prepared by the French Civil Protection Team dated 13 September 2006, which showed the soil at Akouédo to be between pH9 and 10 (this sample was taken after heavy rains on the night of 3-4 September 2006). In these documents, Trafigura made "an estimate of the most rapid likely reduction in pH over time" and stated that "after around 22 days the pH would drop to 9.5". See Trafigura Reply, *Trafigura v BBC*, paras. 124 and 134. The toxicologist consulted by Amnesty International and Greenpeace commented that, well before this, the majority of mercaptans would have evaporated with their rate of evaporation reaching maximal values when the pH was between 10.6 and 11. The time taken to reach these higher pH values can only be surmised.

of inhaling significant quantities of mercaptans would be headache, nausea and vomiting, coughing, dizziness and drowsiness. Mercaptans are recognized irritants of the eyes, skin, and respiratory tract. Both eyes and skin become red and painful, and prolonged exposure of the skin causes dermatitis. Mercaptides would be a source of mercaptan vapours as the pH of the waste decreased after it was dumped, but mercaptides themselves are also hazardous chemicals, including by skin contact, ingestion and aspiration (i.e., inhalation of droplets).

- **Sulphides:** It is more difficult to determine whether individuals would have been exposed to hydrogen sulphide and in what concentrations. Hydrogen sulphide would be released if the pH (of parts of) the waste fell to between 7 and 8. Trafigura has taken the position that hydrogen sulphide could only have been released from the slops following the addition of “a significant amount of strong acid” and they state that there is no evidence whatsoever of any such “significant acidification event”.⁵⁷ The toxicologist consulted by Amnesty International and Greenpeace stated that, over time, it is likely that this lower pH could have been reached for some of the waste because of dilution by rainfall and contact with other soil ingredients. However, on the basis of the information available, it is not possible to say how long it would have taken to reach this stage. The effects of exposure to hydrogen sulphide depend on the concentration of the chemical itself; high concentrations create the greatest risk. Hydrogen sulphide is irritating to the eyes and respiratory tract and affects the central nervous system. The effects of exposure are known to include headache, dizziness, cough, sore throat, nausea, and laboured breathing. Exposure of the eyes will result in them becoming red, painful, and there may be severe deep burns. Exposure to high concentrations of hydrogen sulphide can result in unconsciousness and death.
- **Benzene, xylene and toluene:** Their concentrations in the air in Abidjan following the dumping of the waste are not known. Exposure to these organic chemicals could have had a range of negative health impacts. For example, the effects of inhaling benzene include dizziness, drowsiness, headache, nausea, shortness of breath, convulsions and unconsciousness. Many of these chemicals are respiratory tract irritants, and exposure could exacerbate breathing problems in individuals with conditions such as asthma or bronchitis.

See pages 217 to 220 of *The Toxic Truth* for detailed information on the likely effects of exposure, based on the publicly available evidence.



Bags of contaminated material at one of the dumpsites on the Route d'Alepe on the outskirts of Djibi village. February 2009
© Amnesty International

57. Trafigura Reply, *Trafigura v BBC*, Summary of Reply, para. 5 and Reply, paras. 120-128. Trafigura also state in para. 124.2 that, in the report prepared by the French Civil Protection Team dated 13 September 2006, they note “an absence of hydrogen sulphide” in samples taken by them on 9 September 2006.

TRAFIGURA'S POSITION ON THE DUMPING OF THE TOXIC WASTE AND ITS HEALTH AND ENVIRONMENTAL IMPACTS

Trafigura denies responsibility for the dumping and maintains that it believed the local company it hired to dispose of the waste in Abidjan would do so safely and lawfully.⁵⁸ In *The Toxic Truth*, Amnesty International concluded that Trafigura's claim lacks credibility. Amnesty takes the position that Trafigura is responsible for the dumping of the toxic waste in Abidjan. Trafigura made the waste on board the ship. Trafigura knew the waste would be dangerous and require careful treatment and disposal, but it refused to pay for proper disposal when this option was offered in The Netherlands. Trafigura knew – or should have known – that the company it handed the waste over to in Abidjan was incapable of dealing with it properly. Trafigura also knew – because it stated so in its agreement with the disposal company – that the waste company planned to dispose of the waste at a domestic waste dumpsite called Akouédo. As events unfolded only some of the waste was dumped at Akouédo while the rest was dumped around various parts of Abidjan.

Trafigura has also addressed the potential health and environmental impacts of the dumping.

HEALTH

Trafigura initially denied that the waste could have any health effects and claimed that people may have been attending medical facilities in the days immediately after the dumping for other reasons.⁵⁹ The company later accepted that the waste “could at worst have caused a range of short term low-level flu like symptoms and anxiety” but still strongly denies that it could have caused skin conditions, loss of sight, deaths, miscarriages or serious or long-term illnesses.⁶⁰ Trafigura states that this is supported by the work of independent experts who have estimated – based on modelling, assumptions as to falls in pH and some actual pH measurements – what quantity of chemicals would evaporate and over what period.⁶¹

However, Trafigura has never made public the underlying expert evidence on which this assessment is based, and this data is now confidential following the settlement of UK court proceedings brought against the company by victims of the dumping. Trafigura's claims cannot therefore be verified. Further, Amnesty International and Greenpeace's report *The Toxic Truth* documented how victims suffered a range of serious health issues, including respiratory problems, severe abdominal pain and digestive problems consistent with the likely effects of exposure to the chemicals thought to be in the waste. Additionally, as noted in Section 1.2 (Health Impact) above, doctors involved in the emergency medical response reported other health issues such as cardio-vascular symptoms and some cases of miscarriages that they believed may have been linked to exposure to the waste.⁶²

In support of its position, Trafigura also points to the Abidjan mission report of the UN Disaster Assessment and Coordination team (UNDAC) of 18 September 2006, in which UNDAC states:

58. For full details of Trafigura's position and its responses to Amnesty's work, including *The Toxic Truth*, see www.trafigura.com/resource-centre/probo-koala/ and amnesty.app.box.com/v/TrafiguraResponse.

59. Trafigura Amended Defence, *Motto v Trafigura*, 5 December 2008, paras. 282 and 292.

60. Trafigura, *The Probo Koala Case in 12 Questions: Were the slops actually toxic?*, www.trafigura.com/resource-centre/probo-koala/ (accessed 15 September 2017).

61. Trafigura Reply, *Trafigura v BBC*, paras. 118-178.

62. Amnesty International interviews with: Dr. Bleu, by telephone, June 2011; Dr. K, by telephone, June 2011. See also HMA, *Bilan de Gestion*, p. 7; Dr. K, *Witness Statement*, para. 34; Dr. A, *Witness Statement*, para. 13; Witness Statement of Dr. Danielle Obodou Ipou, *Motto v Trafigura*, para. 13.

It is believed that three weeks after the dumping of the waste the concentrations of the concerned compounds in the air are low and no further adverse health effects are to be expected. However the chemicals, especially mercaptans have strong smells at low concentrations. The smell is already detectable by the human nose at concentrations far below danger levels. This may give a false impression of toxicity.⁶³

However the accuracy of this conclusion is debateable given the lack of general underlying data on the variables prevailing at the time of the dumping, which could have affected the rates of release or dispersal of hazardous chemicals in the waste. A toxicologist consulted by Amnesty International and Greenpeace in 2010 confirmed that many factors could have altered exposure to chemicals and their impact on people living or working near the sites including: weather conditions (ambient temperature, rainfall and wind speed and direction), the quantity of waste dumped and its composition, the method of dumping, the conditions at the 18 dumpsites (such as the presence of other chemicals and the pH of surrounding soil), and the susceptibility of affected individuals to those chemicals.⁶⁴ For example, after it rained heavily in Abidjan at the beginning of September 2006, one doctor noted that the smell and people's symptoms became much worse.⁶⁵ These variables drastically affect estimations of the likely impacts of the dumping on people living in the city. This is important because it concerns the underlying accuracy of any modelling exercise, including Trafigura's.

Furthermore, an epidemiological survey conducted by the *Centre Suisse de Recherches Scientifiques en Côte d'Ivoire* (CSRS) in late 2006 found that people surveyed were still exhibiting symptoms four months after the dumping. Between 12 October and 12 December 2006, CSRS conducted a survey of 809 households in five residential areas affected by the dumping – Akouédo, Dokui, Djibi, Koumassi and Abobo Plaque.⁶⁶ The results of that survey revealed that “21.11% of the toxic waste victims were still showing symptoms at the time of the enquiry, that is, 4 months after the dumping of the toxic waste”, mostly in Akouédo, Dokui and Djibi.⁶⁷ A clinical examination of people still showing symptoms revealed the most common symptoms were coughing (37.1%), asthenia (abnormal physical weakness or lack of energy) (33.1%) and pruritis (itching, abdominal pain and nausea (each 29%).

ONGOING POLLUTION AND LONG-TERM HEALTH EFFECTS

As noted above, Trafigura strongly denies that the waste could cause long-term illnesses (although it has kept confidential the underlying expert evidence on which this is based). It has also stated that “It is believed that ... there is no ongoing pollution related to the slops, hence no long-term effects can be expected due to long-term exposure”.⁶⁸ This conclusion appears to be based on the work of Tredi, Burgeap and Biogénie (concerns as to the completeness of which are outlined in Section 1.3 (Environmental Impact) above) as well as tests undertaken by an environmental consultant called WSP in 2008/2009 (the limitations of which are outlined below).

In December 2008, Trafigura instructed environmental consultant WSP to undertake an environmental audit around Abidjan, including to assess if “identified contaminants” (which are not specified in the summary report made publicly available by Trafigura) were still present at the dumpsites.⁶⁹ According to WSP's summary report, during the initial

63. Trafigura, *The Probo Koala Case in 12 Questions: Were the slops actually toxic?*, www.trafigura.com/resource-centre/probo-koala/ (accessed 15 September 2017).

64. Based on the Expert Opinion provided to Amnesty International and Greenpeace Netherlands by Alastair Hay, Professor in Environmental Toxicology, University of Leeds, 29 October 2010.

65. Dr. Bouaffou, *Witness Statement*, para. 7.

66. CSRS, *Fieldwork Results*, p. 8 and 12.

67. CSRS, *Fieldwork Results*, p. 33.

68. Trafigura, *The Probo Koala Case in 12 Questions: Have the “dump sites” been fully remediated?*, www.trafigura.com/resource-centre/probo-koala/ (accessed 23 September 2017).

69. WSP Environment & Energy, *Works in Abidjan, Ivory Coast: Summary Report*, July 2009, www.trafigura.com/images/probo-koala/WSP_Environmental_Report_Summary_24_July_2009.pdf (accessed 23 September 2017) (hereafter WSP, Summary Audit Report).

stages of investigations in December 2008 and January 2009, it visited 14 of the 18 known dumpsites⁷⁰ and took air, soil, sediment and surface water samples at six of those 14 sites and three control sites. During subsequent investigations in March 2009 and June 2009, WSP took further air samples from two of the six dumpsites and at one of the dumpsites along the Route d'Alépé. WSP's summary report concludes that "no risk to human health has been identified at the investigated Subject Sites from the contaminants potentially relating to the Slops" and "no compounds specifically characteristic of the Slops have been detected at any of the Subject Sites". WSP did find "small traces of light hydrocarbons and sulphides which could possibly relate to the Slops" at the dumpsites at the domestic waste dump at Akouédo but notes that these compounds could have come from other waste or naturally occurring processes.⁷¹

In late 2016, and following UNEP's announcement in July 2016 that it would be conducting an environmental audit of all the known dumpsites, Trafigura hired Ramboll Environ to assess the potential residual contamination from the waste.⁷² According to an executive summary of their report made publicly available by Trafigura, Ramboll independently assessed data from the samples taken by Burgeap in 2007 (i.e., at the dumpsites along the Route d'Alépé) and by WSP in 2009 (i.e., at seven of the 18 known dumpsites) to test the validity of their conclusions. Ramboll found that Burgeap and WSP's conclusions were still valid and, "[b]ased on the available sampling data and taking into consideration the ... natural degradation properties [of the principal chemicals in the waste]", concluded that "10 years after the deposit of the slops and remediation of the sites, there is no residual contamination from the slops present at concentrations that could cause adverse human health effects".⁷³

However, the conclusions in these summary reports cannot be verified as Trafigura has not made the full reports and findings by WSP or Ramboll publicly available. Furthermore, the conclusions are based on samples taken at only seven of the 18 known dumpsites, as well as assumptions as to the degradation of the chemicals in the waste. The limitations of modelling in light of the variables that could affect the likely impacts of the dumping on people living in Abidjan have already been highlighted above. It is also unclear how such a definitive statement as to long-term health impacts can be made in the absence of any monitoring of the health records of the local population or a proper epidemiological study of the population to assess any changes in health or increased mortality. Furthermore, in reaching that conclusion neither WSP nor Ramboll studied records of attendance at health facilities or spoke to people affected by the dumping.

70. The summary report says that four of the dumpsites "could not be visited due to either security concerns or access restrictions" (WSP, *Summary Audit Report*, p. 1).

71. WSP, *Summary Audit Report*, para. 2.3.

72. Trafigura, *The Probo Koala Case in 12 Questions: Is there any residual contamination from the Probo Koala slops in Abidjan?* www.trafigura.com/resource-centre/probo-koala/ (accessed 23 September 2017).

73. Ramboll Environ, *Abidjan – Ivory Coast, Assessment for Potential of Residual Contamination from the Probo Koala slops: Executive Summary Report*, www.trafigura.com/media/4123/executive-summary-of-ramboll-environ-report-6th-december-2016.pdf (accessed 26 September 2017), p. 1.

2. THE CASE FOR A LONG-TERM HEALTH STUDY

“We would like to know the contents of the waste and what degree of danger we are exposed to. ... If someone is the victim of something, they have the right to know what the damage is and to know the health consequences in the short and long-term.”

– Gisele Kone, Teacher, Djibi Village, Abidjan, July 2016⁷⁴

The publication of UNEP’s environmental audit is an important first step in helping to address people’s fears about ongoing contamination at the dumpsites. An equally important – and long overdue – second step is identifying and addressing any long-term health impacts.

The dumping violated the right to health of the people of Abidjan and had a devastating impact on their health and environment. Despite this, no one has ever checked up on or monitored their health or fully assessed any actual or potential long-term health risks of exposure to the chemicals in the toxic waste. This lack of action and information has left a legacy of fear in Abidjan that still needs to be addressed. It also means that, to this day, the violation of people’s right to health has never been fully remedied.

2.1 LEGACY OF FEAR

Amnesty International has spoken to people who live or work near the dumpsites at various times between 2009 and 2016. They have consistently expressed concerns about the long-term impacts of the dumping on their health and the health of their children. This fear has three very real and inter-related origins – none of which have ever been fully addressed.

First, people are still unaware of the contents of the toxic waste. To this day, the exact chemical composition of the waste is not known because Trafigura has never released all the information it holds about its content. The Côte d’Ivoire Ministry of Environment has made public some information collected in Abidjan about the contents of the waste. However, people interviewed by Amnesty International in July 2016 still wanted to know what was in the waste and were generally unaware of what authorities knew and had made public about its composition.⁷⁵ One woman told Amnesty International “There is no information from the government about the contents of the waste. I am worried about my long term health.”⁷⁶

Second, people are concerned about the completeness of the clean-up operation. This in turn creates a fear that they are still being exposed to chemicals in the waste and have been since the waste was dumped (see in particular “The Case of Djibi Village” below). The official clean-up operation began on 17 September 2006, nearly four weeks after the dumping. The Côte d’Ivoire government announced the completion of these operations in November 2015, over nine years after the dumping. This has yet to be verified by UNEP.

74. Amnesty International interview with Gisele Kone, Djibi village, Abidjan, 13 July 2016.

75. Amnesty International interviews in Abidjan with: Olivier Zago, 9 July 2016; Elise Nguessan, 12 July 2016; Idrissa Zampou, 12 July 2016; Mme. L, 12 July 2016; Patrice Kouamé, 12 July 2016; Mme. N, 12 July 2016; Eugène Koffi, 12 July 2016; Gisele Kone, 13 July 2016; Mme. F, 13 July 2016; Dr. Kouamé, 13 July 2016; Ali Famissa, 14 July 2016; Dr. Bouaffou, 15 July 2016.

76. Amnesty International interview with Mme. F, Abidjan, 13 July 2016.

Over that period, residents have consistently expressed concerns to Amnesty International about lingering pollution at the dumpsites. When Amnesty International interviewed residents of Abidjan, including doctors, between 2009 and 2012, they claimed that they could still smell the toxic waste's distinctive smell whenever it rained or after periods of heavy rain (when gases from the waste may have been released into the air).⁷⁷ When Amnesty returned to Abidjan in December 2013 and July 2016, some people still complained of the smell – particularly those living next to the domestic waste dump at Akouédo, where Amnesty International and Greenpeace estimate that over 220,000 litres of the waste were dumped.⁷⁸ A man living next to Akouédo told Amnesty International that “every time it rains it has a psychological effect as we are scared”.⁷⁹ Another man said “they are worried that there will be consequences, they have never known the contents of the waste, when it rains they still smell it”.⁸⁰

Despite this, Amnesty researchers saw vegetables growing at and next to the dumpsites when they visited Akouédo in December 2013 and in July 2016 (see cover photo and photo on page 9). Amnesty researchers were told by one doctor and by two residents that these vegetables may end up in local markets, although researchers were unable to verify this information.⁸¹ In its 2006 strategic plan for addressing the dumping, the Côte d'Ivoire government recognised the long-term need to prevent contaminants in the toxic waste

from entering the food chain, including through the agricultural sector.⁸² Amnesty International has raised similar concerns with the Côte d'Ivoire government on various occasions as well as the fact that people are growing vegetables at the dumpsites, but is not aware of the government taking any action in response.⁸³ However, UNEP did collect vegetables growing near the dumpsites for testing during its mission to Abidjan in July 2016.⁸⁴

Third, people continue to believe that they are ill because of exposure to the chemicals in the toxic waste. During Amnesty's visit in July 2016, researchers spoke to 38 residents from across Abidjan about any ongoing impacts of the dumping on their health or the health of their children. All but three said that they or their children still suffer health problems. They complained of issues such as skin and eye problems, headaches and breathing difficulties to more serious illnesses like strokes and fibroids.⁸⁵

People interviewed by Amnesty, including doctors, have also consistently called for health check-ups and monitoring.⁸⁶ One doctor told Amnesty International “We need long-term monitoring, including so we can know whether the symptoms people declare are linked to the dumping. At the time [of the dumping] the treatment was symptomatic. It's a public health issue, because lots of people were affected. Those who have been affected should have long-term follow-up, but they haven't had any.”⁸⁷

77. Amnesty International interviews with: A member of the Vridi Workers Union, Abidjan, February 2009; Salif Konate, by telephone, February 2010; Chef Motto, by telephone, May 2011; Françoise Kouadio, by telephone, January 2012; Dr. K, by telephone, June 2011.

78. Amnesty International interviews in Abidjan with: residents of Akouédo, 7 December 2013 and 9 July 2016; Elise Nguessan, 12 July 2016; Idrissa Zampou, 12 July 2016; M. K, 12 July 2016; Mme. L, 12 July 2016; Eugène Koffi, 12 July 2016; Patrice Kouamé, 12 July 2016; Mme. N, 12 July 2016. For information as to the potential amount of waste dumped at Akouédo, see Amnesty International and Greenpeace, *The Toxic Truth*, p. 212.

79. Amnesty International interviews with residents of Akouédo, Abidjan, 9 July 2016.

80. Amnesty International interview with Olivier Zago, Abidjan, 9 July 2016.

81. Amnesty International interviews with Rachel Gogoua, Abidjan, 14 February 2009; Dr. C, Abidjan, 10 December 2013; Olivier Zago, Abidjan, 9 July 2016.

82. *Plan stratégique national 2006-2009 de lutte contre les déchets toxiques du Probo Koala et leur impact sur l'environnement et la santé de la population*, December 2006, p. 13, www.dechetstoxiques.gouv.ci/pdf/plan-strategique-final.pdf (accessed 13 September 2017).

83. Amnesty International letters to the Prime Minister of Cote d'Ivoire, 12 December 2011, the Minister of Health, 2 June 2017 and the Minister of Hygiene, Environment and Sustainable Development, 2 June 2017; Amnesty International interview with the Joint Cabinet Director and Inspector General, Ministry of Health, 14 July 2016.

84. Amnesty International interview with the United Nations Environment Programme, Abidjan, 12 July 2016.

85. Amnesty International interviews, Abidjan, 7-15 July 2016.

86. Amnesty International interviews in Abidjan with: Angèle N'Tamon, 15 February 2009; Mr. E, 8 December 2013; Mme. O, 8 December 2013; Patrick Soh, 7 July 2016; Olivier Zago, 9 July 2016; M. K, 12 July 2016; Mme. N, 12 July 2016; Chef Motto, 13 July 2016; Gisele Kone, 13 July 2016; Mme. F, 13 July 2016; Dr. Kouamé (Paediatrician at Bingerville Central Hospital), 13 July 2016; Dr. Bouaffou (Head of the Clinic at MACA Prison), 15 July 2016.

87. Amnesty International interview with Dr. Kouamé (Paediatrician at Bingerville Central Hospital), Abidjan, 13 July 2016.

THE CASE OF DJIBI VILLAGE

The case of Djibi village starkly illustrates the human impact of the lack of action and information about the long-term health and environmental risks of the dumping.

Djibi was particularly badly affected by the dumping of the toxic waste in August 2006, as the village is close to three dumpsites along the Route d'Alépé, a main transport route into Abidjan. Despite this, villagers experienced significant delays in both the health and environmental response.

Mobile health units were only dispatched to Djibi village in mid-September 2006, even though the head of the village had alerted the authorities soon after the dumping that the village had been badly affected. One doctor involved in the medical response in the village reported that "From the time that my team and I spent in Djibi ... I think it likely that the entire population of that village were victims of the waste".⁸⁸

During the initial stage of the clean-up operation, Tredi dug out some soil from the dumpsites near Djibi and then simply covered the remaining polluted soil with a clean layer of soil.⁸⁹ In March 2007, Tredi reportedly submitted a new proposal to deal with the remaining pollution at the sites but the decontamination work carried out by Tredi effectively stopped shortly afterwards.⁹⁰ As noted in Section 1.3 (Environmental Impact) above, in July 2007, Burgeap recommended treating the dumpsites along the Route d' Alépé because of the persistent smell and the sites' proximity to Djibi village. Over a year after the dumping, in October 2007, Biogénie undertook some initial treatment work at these sites by packing the polluted soil into big bags. The bags were then left on site until Biogénie began treating the soil in March 2010.

This means that, between the end of 2007 and March 2010, bags of polluted soil were left next to a road crossed by residents of Djibi village on a daily basis. When Amnesty International visited this site in February 2009, researchers found that many of the bags were ripped open and exposed to the elements and that the barbed wire surrounding them had not been properly maintained (see photo on page 15). A local man who had been hired by the authorities to guard the site told Amnesty researchers that he had not been paid for months but that he continued to monitor the site because he was concerned about the bags lying about in such an unsecured state.⁹¹ The Côte d'Ivoire government announced in November 2015 that the clean-up of these sites (known as Alépé 1 and 2) had been completed.

People living in or near Djibi village have consistently complained about the smell from the waste when it rains, although they say it has improved since completion of the clean-up work.⁹² A villager also told Amnesty International in December 2010 that, when Biogénie re-started its clean-up work in March 2010, there was a resurgence of the smell and some villagers had again displayed symptoms of ill-health and were afraid of the implications of re-exposure.⁹³ In July 2016, Amnesty researchers spoke to nine residents of Djibi village who were affected by the dumping, including one child.⁹⁴ Seven of them complained of health problems that they believe are linked to the dumping.

The village has asked the Côte d'Ivoire government several times to assess the health of people in Djibi.⁹⁵ The head of the village told Amnesty researchers in July 2016 that "We are dead people walking and despite everything we have been abandoned by the state".⁹⁶ The Côte d'Ivoire government has recently begun some testing of victims in Djibi village but does not currently have the funds to expand this to other areas.⁹⁷

88. Witness Statement of Manasse Goule, 6 August 2008, *Motto v Trafigura*, para. 15.

89. Burgeap, *Phase 2 and 3 Report*, p. 10.

90. According to sources close to the clean-up operation. See Amnesty International and Greenpeace, *The Toxic Truth*, footnote 636.

91. Amnesty International interview, Abidjan, February 2009.

92. Amnesty International interviews with: Chef Motto, by telephone, May 2011 and in Abidjan, 13 July 2016; and with residents of Djibi village, Abidjan, 13 July 2016 and 15 July 2016. Greenpeace interview with Bagassi Koura, January 2010.

93. Amnesty International interview with Desire N'Tamon, by telephone, December 2010.

94. Amnesty International interviews with residents of Djibi village, Abidjan, 13 and 15 July 2016.

95. Amnesty International interview with Chef Motto, Abidjan, 13 July 2016.

96. Amnesty International interview with Chef Motto, Abidjan, 13 July 2016.

97. Amnesty International interview with the Director General and Inspector General, Ministry of Hygiene, Environment and Sustainable Development, 14 July 2016.

2.2 OBLIGATIONS UNDER INTERNATIONAL HUMAN RIGHTS LAW

Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) guarantees “the right of everyone to the enjoyment of the highest attainable standard of physical and mental health” and the right to a healthy environment.⁹⁸ The UN Committee on Economic, Social and Cultural Rights, the expert body that monitors the implementation of ICESCR, has clarified that the right to a healthy environment includes requirements for “the prevention and reduction of the population’s exposure to harmful substances such as radiation and harmful chemicals or other detrimental environmental conditions that directly or indirectly impact upon human health”.⁹⁹

Amnesty International believes that the dumping amounted to a breach by the Côte d’Ivoire and The Netherlands of their obligation, as state parties to the ICESCR, to protect the people of Abidjan from infringements of their right to health by third parties including companies.¹⁰⁰ In particular, the Côte d’Ivoire government failed to comply with its obligation to enforce laws to prevent the import of hazardous waste into the country, and the Dutch government failed to prevent Trafigura from exporting hazardous waste that ultimately ended up in Côte d’Ivoire (see Section 1.1 (The dumping of the toxic waste) above).¹⁰¹

These breaches, in turn, give rise to an obligation on the Côte d’Ivoire and The Netherlands to provide an effective remedy to the victims of the dumping for the violation of their right to health.¹⁰² As long as the victims’ right to an effective remedy remains unfulfilled in relation to an act for which that particular state is responsible, the Côte d’Ivoire and The Netherlands remain under an obligation to provide meaningful access to a procedure capable of providing an effective remedy.¹⁰³ Although the Côte d’Ivoire government responded quickly to the crisis, it has not checked up on or monitored the health of victims, or fully assessed any actual or potential long-term health risks of exposure to the chemicals in the toxic waste. Additionally The Netherlands has not engaged with the Côte d’Ivoire government to support such a process, including through offering funding or technical assistance for example.

As to addressing the long-term health impacts of the dumping in particular, the Committee on Economic, Social and Cultural Rights considers that a core obligation of states parties under the right to health is to “provide education and access to information concerning the main health problems in the community, including methods of preventing and controlling them”.¹⁰⁴ The Committee has also clarified that the right to health includes “the provision of equal and timely access to basic preventive, curative, rehabilitative health services and health education; regular screening programmes; appropriate treatment of prevalent diseases, illnesses, injuries and disabilities, preferably at community level”.¹⁰⁵ In his 2009 report on the

98. Article 12.1 and 12.2(b) of ICESCR.

99. Committee on Economic, Social and Cultural Rights (CESCR), *General Comment No. 14: The Right to the Highest Attainable Standard of Health* (Art. 12), UN Doc. E/C.12/2000/4, 11 August 2000, para. 15 (hereafter *General Comment 14*).

100. CESCR, *General Comment 14*, para. 33. CESCR also makes clear in General Comment 14 that “To comply with their international obligations in relation to article 12, States parties have to respect the enjoyment of the right to health in other countries, and to prevent third parties from violating the right in other countries, if they are able to influence these third parties by way of legal or political means, in accordance with the Charter of the United Nations and applicable international law.” (para. 39).

101. For further detail, see Amnesty International and Greenpeace, *The Toxic Truth*, Ch. 8 and 9.

102. Specifically in relation to the right to health, CESCR has emphasized that any person or groups who are victims of a violation of the right to health “should have access to effective judicial or other appropriate remedies at both national and international levels. All victims of such violations should be entitled to adequate reparation, which may take the form of restitution, compensation, satisfaction or guarantees of non-repetition” (General Comment 14, para. 59).

103. International Law Commission, *Articles on Responsibility of States for Internationally Wrongful Acts*, 31 May 2001, Arts. 31 and 47.

104. CESCR, *General Comment 14*, para. 44(d).

105. CESCR, *General Comment 14*, para. 17.

dumping, the UN expert on hazardous waste recommended that the Côte d'Ivoire government and relevant state actors: "Ensure full access to information for those affected on measures taken to address possible long-term adverse effects on health and the environment of the incident" and conduct

"a health survey in affected areas and a mapping of outstanding health issues and providing adequate medical assistance to victims, including treatment of new and long-term manifestations of illnesses as a result of the dumping".¹⁰⁶

THE BOGUI STUDY

Only one study has tried to identify the potential long-term implications of exposure to the chemicals in the toxic waste.

In early 2007, just over five months after the toxic waste dumping, a professor at the University of Cocody Abidjan started researching the effects of inhaling chemicals released from the toxic waste. The aim of Professor Bogui's research was to establish whether there was a strong probability of a causal relationship between prolonged exposure to the toxic waste and an increase in the incidence of chronic respiratory symptoms as well as a rise in the prevalence of bronchial hyper-responsiveness. Bronchial hyper-responsiveness (also known as bronchial or airway hyper-reactivity or hyper-responsiveness) is marked by "excessive bronchial narrowing" and is recognised as a hallmark of chronic asthma.¹⁰⁷

Carried out by the University of Cocody and funded by the World Bank, the Swiss Centre for Scientific Research in the Côte d'Ivoire, the UN Population Fund, UNICEF and the World Health Organization, the study lasted for 40 months between 1 March 2007 and 31 July 2010 and comprised three stages.¹⁰⁸

STAGE 1

Two separate groups of subjects filled out a questionnaire that surveyed the incidence of 16 chronic respiratory symptoms. The first group – the control group or the "Non-Exposed" group – originally comprised 4,288 people who lived far outside of Abidjan and had not lived in Abidjan in the 12 months preceding the dumping. The second group – the "Exposed" group – originally comprised 1,138 people who lived or worked in Dokui Plateau (a residential neighbourhood located near two of the dumpsites), and who had spent at least 60 days in the neighbourhood in the three months immediately following the dumping. Professor Bogui chose Dokui Plateau because of the particular nature of this area – it was a residential zone far from a source of industrial pollution.¹⁰⁹

The responses to the questionnaire showed that, for seven of the 16 chronic symptoms, people in the Exposed group reported a higher incidence (two to five times higher, depending on the symptom) than people in the Non-Exposed group.

106. Okechukwu Ibeanu, *Report of the Special Rapporteur on the adverse effects of the movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights: Mission to Cote d'Ivoire (4 to 8 August 2008) and the Netherlands (26 to 28 November 2008)*, UN Doc. A/HRC/12/26/Add.2, 3 September 2009, paras. 86(c) and (f), www2.ohchr.org/english/bodies/hrcouncil/docs/12session/A-HRC-12-26-Add2.pdf (accessed 23 October 2017).

107. Diana C. Grootendorst and Klaus F. Rabe, *Mechanisms of Bronchial Hyperreactivity in Asthma and Chronic Obstructive Pulmonary Disease*, www.atsjournals.org/doi/full/10.1513/pats.2306025 (accessed 5 October 2017).

108. Professor Bogui, *Atelier de restitution des resultats et projet d'achevement de l'etude relative a la toxicite respiratoire chez l'homme de l'exposition prolongee aux emanations degagees par les dechets petroliers du Probo Koala*, 28 June 2012 (on file with Amnesty International) (hereafter Bogui Study).

109. Professor Bogui, *Prévalence comparée des symptômes chroniques et de l'hyper-réactivité bronchique entre Exposés de longue durée et Non Exposés aux déchets pétroliers du Probo Koala: Evaluation de la persistance de l'hyper-réactivité bronchiques induite cinq ans après la fin presumée de l'exposition (Phase 3 / 3 du projet)*, 22 February 2012, p. 10 (on file with Amnesty International).

STAGE 2

In 2007, Professor Bogui tested the respiratory function of a random sample of people from the two groups, who were neither asthmatic nor smokers. This comprised 244 people in the Non-Exposed group and 89 people in the Exposed group. The tests consisted of a spirometry test, which tests how much air you can breathe out in one forced breath, and a bronchial challenge test.

The results of the spirometry test were similar between the Exposed and Non-Exposed groups. However, in the bronchial challenge test, the frequency of bronchial hyper-responsiveness was four times higher in the Exposed subjects than in the Non-Exposed subjects.

STAGE 3

In 2010, Professor Bogui re-evaluated the respiratory function of 22 people in the Exposed group to determine whether there was any persistence of the significant bronchial hyper-responsiveness observed in the Exposed subjects at Stage 2.

The results of Stage 3 revealed that, three years on from the dumping, the significant bronchial hyper-responsiveness had disappeared in 17 of the 22 people (i.e., 77% of the cases). The prevalence of bronchial hyper-responsiveness in this sub-group of the Exposed group had therefore returned to the same level as that found among the Non-Exposed group in 2007.

CONCLUSIONS

The study concluded that there was a strong probability of a causal relationship between prolonged exposure to the chemicals in the toxic waste and an increase in the frequency of the reported chronic respiratory symptoms as well as an increase in the frequency of bronchial hyper-responsiveness by people in the Exposed group compared to the Non-Exposed group.

The study also notes that the decrease in the frequency of bronchial hyper-responsiveness observed in the re-testing in 2010 further supported the argument of a causal relationship, as the disappearance of the cause (in this case, the toxic waste) was accompanied by a return to the normal frequency of bronchial hyper-responsiveness amongst the Exposed subjects.

The study further concluded that the reported symptoms and the changes to respiratory function indicated a deep inflammation of the airways, consistent with the known harmful effects of chronic inhalation of irritant chemicals such as hydrogen sulphide and sodium hydroxide.

The study points out that, after just a few months of exposure to the chemicals in the waste, the prevalence of bronchial hyper-responsiveness in the Exposed subjects is greater than the prevalence seen in people who have smoked more than 20 cigarettes a day for over 10 years.

Although the study primarily focused on the effects of exposure to the chemicals in the waste in the short to medium-term, it also considered the possibility of longer-term effects. The study concluded that “the strong suspicion of the presence in the toxic waste of carcinogenic volatile compounds raises the fear of a deep impregnation of the respiratory mucus membrane of substances likely to result in cancerous lesions”.¹¹⁰

110. Bogui Study, p. 11 (translation by Amnesty International)

3. CONCLUSION AND RECOMMENDATIONS

3.1 CONCLUSION

This briefing has made the health and human rights case for a study to comprehensively assess any long-term health impacts of the August 2006 dumping of toxic waste in Abidjan.

The dumping had a devastating impact on the health and environment of the people of Abidjan, violating their right to health and exposing them to health risks that have never been fully understood or addressed. Eleven years on from the disaster, people in Abidjan still live in fear of the impacts of the dumping on their health and the health of their children.

The failure to monitor the health of victims, and to fully identify and address any long-term health risks, has denied people a meaningful and vital aspect of their right to an effective remedy. The people of Abidjan have a right to know if exposure to the chemicals in the waste could cause long-term health issues and, if so, what they are and how they can be treated.

There are undoubtedly challenges in establishing if exposure to the chemicals in the waste has caused or could cause long-term health impacts. Trafigura itself strongly denies that the waste could cause long-term illnesses or that there is any ongoing pollution that could cause long-term health impacts. But unless and until any impacts are fully assessed and addressed, people in Abidjan will continue to live in fear of the toxic legacy of this disaster.

3.2 RECOMMENDATIONS

TO PUBLIC HEALTH EXPERTS AT THE UNITED NATIONS ENVIRONMENT PROGRAMME AND WORLD HEALTH ORGANIZATION MEETING

Recommend that the Côte d'Ivoire government immediately put in place a study to comprehensively assess any long-term impacts of the dumping on health. The study should:

- Aim to identify any long-term impacts of the dumping on the health of people living or working next to the dumpsites.
- Aim to identify any ongoing risks of being exposed to the chemicals in the waste (particularly in light of the UNEP report), for example due to living or working next to sites with ongoing contamination or due to contamination of water supplies or the food chain.
- Include an epidemiological study of the affected population and a matching control group of individuals who could not have been exposed. The study should be of sufficient size to detect any changes in health or increased mortality and should match individuals according to age, sex, general environment and any other variable to ensure as far as possible that the only difference between the exposed group and the control group is possible exposure to chemicals in the waste. This study should also include people living or working next to each of the known dumpsites.
- For these purposes, obtain relevant information such as:
 - The health records of the local population to see if there has been any change in the frequency of admissions to hospitals or health centres or visits to local medical practitioners in the period immediately prior to the dumping of the waste compared with set periods after the dumping, and to note the symptoms of which individuals complained.
 - Relevant demographic data on mortality and disease patterns.
 - Full details about the chemical composition of the waste and any scientific and other studies carried out in relation to the waste and its potential impact.
 - The potential health effects of exposure to the chemicals in the waste and the concentrations likely to be injurious to health.
- Be independent, impartial and thorough, and undertaken by qualified and competent professionals in the area of public health.

TO THE GOVERNMENT OF CÔTE D'IVOIRE

- Immediately commission the study to comprehensively assess any long-term impacts of the dumping on health, and make specific requests for technical and financial assistance from other governments and international organizations where necessary.
- Develop and implement a plan for the long-term health monitoring of individuals affected by the dumping. This monitoring plan should involve:
 - Regular testing for the chemicals known to be in the waste as well as the known symptoms of exposure to the chemicals in the waste.
 - Active monitoring for any changes in health status through the use of identified health indicators as well as checking for disease patterns.

Information about the availability of health monitoring should be widely disseminated so that individuals who were affected by the dumping but who have left Abidjan are also aware of it.

- Ensure the availability of accessible, affordable and quality health services to address any specific health problems that people affected by the dumping are facing now and in the future. This includes:
 - Availability of health professionals trained in diagnosing and treating health conditions relating to chemicals exposure, as well as drugs and equipment needed to treat any symptoms and health conditions.
 - Spreading information about possible symptoms, available treatment and possible preventative actions – including those involving preventative medical care (such as health screenings) – that people can take before symptoms begin to present, and ensuring the availability of such preventative care.

- Ensure that any such actions meet the government's obligations under international human rights law, in particular by:
 - Accounting for the needs and experiences of possible marginalized groups, including people living in poverty and migrant communities.
 - Respecting informed consent, confidentiality, privacy of health information and the principles of participation and consultation. In particular, ensure people who are tested as part of the long-term health study understand why they are being tested and how their test results will be used, and that they are given their test results in a timely manner.
 - Ensuring all information is provided in a timely, accessible and comprehensible manner and in relevant local languages.

TO THE GOVERNMENT OF THE NETHERLANDS

As a matter of priority, engage with and support the government of Côte d'Ivoire to carry out the recommendations in this briefing, specifically through funding of the study and health monitoring

TO OTHER GOVERNMENTS

Engage with and support the government of Côte d'Ivoire to carry out the recommendations in this briefing.


TO TRAFIGURA


Disclose full information on the waste, including scientific and other studies carried out in relation to the waste and its potential impacts.



**AMNESTY INTERNATIONAL
IS A GLOBAL MOVEMENT
FOR HUMAN RIGHTS.
WHEN INJUSTICE HAPPENS
TO ONE PERSON, IT
MATTERS TO US ALL**

CONTACT US

 info@amnesty.org

 +44 (0)20 7413 5500

JOIN THE CONVERSATION

 www.facebook.com/AmnestyGlobal

 @AmnestyOnline

A TOXIC LEGACY

THE CASE FOR A MEDICAL STUDY OF THE LONG-TERM HEALTH IMPACTS OF THE TRAFIGURA TOXIC WASTE DUMPING

On 20 August 2006, the people of Abidjan in Côte d'Ivoire woke to find that foul-smelling, toxic waste had been dumped across their city.

In the following days and weeks, thousands of people around the city streamed into medical facilities complaining of breathing difficulties, nausea, headaches, stinging eyes and burning skin, triggering widespread panic. Over 100,000 people sought treatment according to official records. The dumpsites required extensive clean-up and decontamination.

The dumping amounted to a violation of the right to health of the people of Abidjan, which has never been fully remedied. No one has ever checked up on or monitored the health of affected communities, or fully assessed any long-term health risks of exposure to the chemicals in the waste. As a result, people in Abidjan live in fear of the toxic legacy of this disaster.

This briefing makes the health and human rights case for a study to comprehensively assess the long-term health impacts of this disaster.

Eleven years on, the people of Abidjan have a right to know if exposure to the chemicals in the waste could cause long-term health issues and, if so, what they are and how they can be treated.