



European Commission





# Toxic Sites Identification Program (TSIP) in Ghana

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Prepared for: UNIDO

Date: November 2018







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# LIST OF ACRONYMS

ADB	Asian Development Bank
AMA	Accra Metropolitan Assembly
EC	European Commission
EEE	Electrical and Electronic Equipment
EPA	Environmental Protection Agency
GAEC	Ghana Atomic Energy Commission
GAHP	Global Alliance on Health and Pollution
GASDA	Greater Accra Scrap Dealers Association
GreenAd	Green Advocacy Ghana
GSA	Ghana Standards Authority
ISS	Initial Site Screening
LMIC	Low and Middle-Income Countries
MESTI	Ministry of Environment, Science, Technology and Innovation
MMDAs	Metropolitan, Municipal and Districts Assemblies
NDPC	National Development Planning Commission
NGO	Non-Governmental Organization
NYA	National Youth Authority
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PE	Pure Earth
PPB	Parts per Billion
PPM	Parts per Million
TSIP	Toxic Sites Identification Program
ULAB	Used Lead Acid Batteries
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VOCs	Volatile Organic Compounds
WB	World Bank
XRF	X-Ray Fluorescence

# LIST OF ANNEXES

Annex 1 TSIP Sites Annex 2 Research Articles Annex 3 Agbogbloshie Samplling







# ACKNOWLEDGEMENTS

This activities described in this report were supported by the European Commission and the United Nations Industrial Development Organization project "Mitigating Toxic Health Exposures in Low-and Middle-Income Countries: Global Alliance on Health and Pollution" (DCI-ENV/2015/371157).

# INTRODUCTION

Pure Earth's engagement in Ghana began with the signing of a partnership Memorandum of Understanding in 2010 with Green Advocacy Ghana (GreenAd), an environmental advocacy organization. Per the agreement, GreenAd Ghana would act as the secretariat for PE's work on pollution and health issues in Ghana. The main activities focused on the Toxic Sites Identification Program (TSIP) across all regions in Ghana.

Several key stakeholders were identified and consulted. These included:

- MMDAs of all regions assessed
- Environmental Health Departments
- Ministry of Environment, Science, Technology and Innovation (MESTI)
- Environmental Protection Agency (EPA) of Ghana
- Ghana Health Service
- Ghana Atomic Energy Commission
- Ghana Standards Authority (GSA)

# **TOXIC SITES IDENTIFICATION PROGRAM (TSIP)**

TSIP work began in Ghana in 2012 with the selection and training of 12 Site Investigators. TSIP training, conducted over two days, consists of both theoretical and practical components. The theoretical training on day one introduced participants to the work of Pure Earth, the health impacts of pollution, and the model of Pollution-Migration-Pathway-People. Participants were also taught how to use a hand-held Alpha Xray Fluorescence (XRF) spectrometer, a precise instrument that permits collection of realtime field data and is key to building in-country capacity to monitor and assess heavy metal contamination. During day two participants visited a site for hands-on experience in using the ISS protocol.

#### **IMPLEMENTATION STRATEGY/COORDINATION WITH GOVERNMENT**





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In order to properly implement the project, coordination with government agencies at all stages of the project was essential. Pure Earth's investigators met regularly with government officials to share data and findings. As such, government officials and their respective community constituents gained a better understanding of the scope of toxic pollution and its impact on public health, economic growth, and sustainable development.

In some cases, government officials accompanied investigators during site assessments to learn about the process. This served to engage the government at a more nuanced level, which helped ensure the sustainability and effectiveness of the project.

Program Implementation Strategies:

- Introduction of the project to national and local government officials
- Recruitment and hiring of researchers with Master's and/or PhD degrees in the environmental field
- Training in conducting of rapid site assessments using the ISS protocol
- Coordination with national and local authorities on sites selection and priorities
- Assessment of sites
  - Including site history, estimation of population at risk, creation of site map, and taking of photos
- Collection of samples (water, soil or air)
- Analysis by reputable laboratory when necessary
- Entry of assessment information into existing TSIP database
- Review of data collected for quality and consistency (performed by PE team in New York)







#### SUMMARY OF KEY RESULTS

From 2012 to 2015, 204 sites were identified, assessed, and uploaded into the TSIP Database. An additional 17 sites were added in 2017 under UNIDO Contract SAP Ref: 150416 for a total of 221 sites (Annex 1). Each site entry includes a description of the contaminated area (coordinates, estimated population at risk, pollutant pathway, pollutant concentration, etc.); pollutant release risks; site stakeholders; relevant linked reports and images.









# Table 1: The number of sites as categorized by pollution source assessed by Pure Earth's TSIP investigators

	Number of Sites
Industry	Identified
Artisanal Mining (hand mining)	86
Mining and Ore Processing	29
Industrial/Municipal Dump Site	18
E-waste recycling	12
Multiple Diverse Industries	11
Lead - Battery Recycling	10
Recycling / Recyclers (including salvage yards)	8
Transportation (bus stations, rail yards)	8
Industrial Estate (mixed industries)	7
Electricity Distribution	5
Agriculture	5
Petrochemical Industries (refineries)	5
Tannery Operations	3
Heavy Industry (casting, rolling, stamping)	3
Chemical Manufacturing (acids, organics, base	
chemicals)	2
Lead Smelting (with ingot production)	2
Dye Industry	2
Product Manufacturing (electronics, equipment,	
clothing)	1
Smelting (Everything Except Lead)	1
Food Processing	1
Pesticide Manufacturing	1
Electroplating	1
Total	221















#### Table 2: Key pollutants identified in Ghana during TSIP site visits

Key Pollutant	Number of Sites Identified
Lead	74
Mercury - elemental	71
Arsenic	22
Cyanide	12
PCBs (PolyChlorinated Biphenyls)	8
Other	7
Chromium (Total)	7
Mercury - organic	6
Cadmium	6
PAH (Total)	2
DDT	2
Fluorides	1
Pesticides	1
Chlordane	1
Endrin	1
Total	221









#### Table 3: Key pollutants identified in Ghana with UNIDO Funding

Key Pollutant	Number of Sites Identified
Arsenic	12
Lead	4
Other	1
Total	17









# Table 3: The number of sites in Ghana as categorized by pollution source assessed with UNIDO funding

Site Industry	Number of Sites Identified
Artisanal Mining (hand mining)	10
Mining and Ore Processing	2
Chemical Manufacturing (acids, organic, base	
chemicals)	2
Industrial/Municipal Dump Site	1
Lead - Battery Recycling	1
Transportation (bus stations, rail yards)	1
Total	17



Investigators collected soil samples with the guidance of a sampling protocol provided by Pure Earth. Lead concentrations in soil were measured in the field using an XRF. When an XRF was not available, samples were sent to a certified local laboratory for analysis.

All sites had significant contamination values for toxic substances. Elemental mercury was present in 71 sites, the majority of which were artisanal mining sites, with





concentrations ranging from 1 to 100 parts per billion (ppb). This translates to great risks to human health. Lead was recorded at 74 sites, many of which were E-waste, dumpsites, or ULAB recycling facilities. Concentrations ranged from 14 to 68,000 parts per million (ppm). The test results for arsenic, found at 22 sites, many of which were artisanal mines, ranged from 4 to 27,300 ppm. This is above Blacksmith's recommended standards of 12 ppm.

#### Health Risks Identified and Other Concerns Identified During Sites Assessments

During site visits, many exposure risks were identified by both the investigators and the workers at the sites. Some of the workers in these industries were aware of the health risks involved, while others were ignorant of the associations between pollution and health. In many cases, workers were experiencing symptoms that could potentially be linked to pollution.

Exposure risks identified included:

- Lack of protective equipment for many workers inhalation/ingestion of polluted air and dermal contact were the primary routes of exposure
- Lack of environmental controls leaching of contaminants into ground and surface water
- Incorrect disposal of waste water during lead recycling especially dangerous in residential areas
- Lack of expertise by medical professionals in recognizing symptoms of pollution exposure (increasing rates of forbearance of protective measures)
- Lack of awareness of health hazards posed by chemical pollution

Health symptoms identified included:

- Memory loss, frequent headaches, miscarriages, lack of appetite and poor body coordination
- Hyperactivity especially in lead contaminated sites
- Chest pains associated with respiratory challenges in pesticides contaminated sites
- Livestock falling ill and/or dying after drinking contaminated water from mining areas

It is noted that the symptoms identified are only a fraction of potential effects. As research continues to identify and confirm pollution linkages, and as further sites are identified (to more accurately measure the pollution burden in a region) it is likely that the list of pollution-related diseases will expand substantially.

#### Pollutants, Sources and Health Impacts

#### Mercury

Mercury occurs naturally in the environment and exists in several forms that can be





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broadly categorized into metallic mercury (elemental mercury), organic (bound with carbon), and inorganic mercury (not bound with carbon). Inorganic mercury compounds occur when mercury combines with elements such as chlorine, sulfur, or oxygen. It is a dense, silvery white, shiny metal, which is liquid at room temperature in its elemental form. The most common organic form of mercury, methyl mercury, is of particular concern as it can accumulate in fish and thus get transferred through the food chain. In general, mercury affects the immune system, alters genetic and enzyme systems, and damages the nervous system, including coordination and the senses of touch, taste, and sight. Exposure to very small amounts of methyl mercury can result in devastating neurological damage or death. Mental retardation, blindness, and cerebral palsy have been observed in children born to women having high levels of methyl mercury exposure. Exposure could have a negative impact on their neurological development resulting in psychological abnormalities like deficits in short-term memory, irritability, and social withdrawal.

#### Lead

Lead pollution emanates from industrial estates that manufacture electrical/electronic equipment, contain lead-acid battery recycling activities, and lead smelters, among other sources. Lead accumulates in soil and can migrate to groundwater. The pathway to humans is mainly through dust inhalation and dermal contact from lead tailings and slag, as adults and children alike can come into contact with these disposed of wastes in the environment. Lead is a known neurotoxin that affects body systems both acutely and chronically. Unborn children and those under the age of 6 years are particularly susceptible to its health effects, which include hindered development of the brain and central nervous system, reproductive problems, kidney damage, stunted growth, learning disabilities and mental retardation, coma, blindness and even death.

#### Arsenic

Arsenic is a naturally occurring, brittle, steel gray semi-metallic solid. Arsenic and its compounds are highly toxic. Arsenic in drinking water causes bladder, lung and skin cancer, and may cause kidney and liver cancer. Studies have also found that arsenic harms the central and peripheral nervous systems, as well as heart and blood vessels, and causes serious skin problems. It also may cause birth defects and reproductive problems. Arsenic can be carcinogenic at very low levels and one-tenth of a gram accumulated over a two-month period can be fatal.







#### ORIGINAL RESEARCH

Following initial rounds of TSIP investigations, researchers refined and executed a protocol for achieving a finer granularity of sites at the district level. The research implemented a grid system that covered eight districts which were randomly selected from eight country regions.

**TSIP Sites and District-Level Survey areas** 



The data generated from the district-based pollution inventory was published in the Annals of Global Health under the title "Spatial Associations Between Contaminated Land and Socio Demographics in Ghana" in 2015.

An additional study, "Estimating the Prevalence of Toxic Waste Sites in Low-and Middle-Income Countries" was published in the International Journal of Environmental Research and Public Health, in 2016.

Both studies can be found under Annex 2 of this report.







#### **REGIONAL TRAINING IN SENEGAL**

In the spring of 2017, a training was conducted in Dakar for PE Ghana and Senegal team as well as officials from DPV on the use of organochlorine pesticide test kits. The training included several site visits to pesticide storage facilities to test for pesticide contamination of surrounding soil.



# **PILOT PROJECT**

#### **Agbogbloshie Scrap Metal Site Phase 1**

The Agbogbloshie scrap metal site in Accra is Ghana's largest center for electronic waste (e-waste) recycling and disposal where workers manually disassemble parts and burning off the plastic encasements on computer wires, refrigerator coils, and other electronics in controlled fires to recover profitable metals, mainly copper. It is estimated that on average two tons of materials passed through the site each week at project initiation. This is an informal area where work is often done by young adults using inefficient tools and without protective equipment, leaving them susceptible to exposure to harmful levels of heavy metals (lead and cadmium among others) and other pollutants. Air pollution from the burning can adversely affect the health of workers and others living and working nearby.

Pure Earth began working in Agbogbloshie to investigate the extent of pollution at the site and to work with local agencies and government officials to design and implement a feasible method for mitigating pollution. See Annex 3 for detailed soil sampling results at the site.

The project consisted of two major components; providing training for the local e-waste association, the Greater Accra Scrap Dealers Association (GASDA); and piloting a new portable station that uses mechanized wire stripping technologies.







#### **Objectives**

- To eliminate cable burning
- To formalize business operations at Agbogbloshie
- To enhance the value of metal recovery

#### Launch of E-Waste Facility

Following extensive community planning meetings on site selection, design, and implementation, as well as community education and outreach efforts, and training in worker safety and protection, the recycling facility launched in October of 2014.

During the six months that the facility was officially monitored, it is estimated that nearly 15,000 pounds of material was cleanly recycled in the new facility. This translates to the following reductions in pollution emissions:

- 6,800 pounds of CO2
- 2,700 pounds hydrochloric acid (pulmonary irritant)
- 14.6 pounds of lead

# **CONCLUSION - CHALLENGES AND RECOMMENDATIONS**

#### Challenges

- 1. Security and safety risks in accessing illegal mining and ULAB sites
- 2. Bureaucratic barriers in obtaining data about sites, e.g. historical data on use and ownership of the site and adjoining land uses
- 3. Sparse site information on record, e.g. years in operation, ownership, etc.
- 4. Land use change in spite of contamination, e.g. a contaminated site may not be available for re-assessment due to erection of homes on such a site

#### **Recommendations**

- 1. MESTI (EPA) should consider using the TSIP database as a resource for understanding the scope of pollution and contaminated sites in Ghana
- 2. The Metropolitan, Municipal and District Assemblies (MMDAs) should consider the health impact of pollution and implement monitoring programs to yield data on areas of concern
- 3. The recycling facility at Agbogbloshie should be used as a knowledge transfer center on e-waste recycling and as basis for replication in other urban centers
- 4. E-waste burning should be officially banned to reduce toxic exposures

# **ANNEX I - TSIP SITES IN GHANA**

### **Total Sites**

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
GH-781	Agbogbloshie, Accra	5.5537	-0.225474	E-waste recycling	Lead
GH-1952	ULAB Recycling Facility Tema, Ghana	5.634094	0.00824	Lead - Battery Recycling	Lead
GH-1954	Tema Heavy Industrial Area	5.63856	0.01305	Product Manufacturing (electronics, equipment, clothing)	Other
GH-2004	AngloGold Ashanti Mine & Teberebie mine, Iduapriem	5.2333	-2.0333	Mining and Ore Processing	Mercury - elemental
GH-2142	Golden Star Mines, Prestea-Bogoso	5.5667	-2.0167	Mining and Ore Processing	Cyanide
GH-2143	Newmont Ghana Gold, Ahafo Mines	7.0333	-2.35	Mining and Ore Processing	Cyanide
GH-2144	Koforidua E-Waste Recycling	6.0833	-0.25	E-waste recycling	Lead
GH-2145	AngloGold Ashanti Mine, Obuasi	6.2	-1.667	Mining and Ore Processing	Mercury - elemental
GH-2146	Space Rock Noyem mine, Eastern Region	6.55	-0.7667	Artisanal Mining (hand mining)	Mercury - elemental
GH-2180	Closed Mercury site, Nyafoman, Birim North	6.4333	-0.95	Artisanal Mining (hand mining)	Mercury - elemental
GH-2181	Damang Tarkwa	5.5167	-1.8333	Artisanal Mining (hand mining)	Mercury - elemental
GH-2184	Mpohor Wassa East mine	4.9667	-1.9	Artisanal Mining (hand mining)	Mercury - elemental
GH-2186	Akyempem Tarkwa, Western Region	5.2833	-1.9667	Artisanal Mining (hand mining)	Mercury - elemental
GH-2187	Kenyasi mine, Brong Ahafo Region	6.9833	-2.3833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2188	Nkaseim mine, Brong Ahafo Region	6.8667	-2.4333	Artisanal Mining (hand mining)	Mercury - elemental
GH-218 <del>9</del>	Abandoned Mercury site, Abompe-	6.35	-0.4833	Artisanal Mining (hand mining)	Mercury - organic

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Site Number	Site Name	Latitude	Lonaitude	Site Industry	Kev Pollutant
	Ankaase, E/R			· · · · · · · · · · · · · · · · · · ·	
GH-2190	Abandoned mercury site, Kyebi-Asikam, E/R	6.201914	-0.533178	Artisanal Mining (hand mining)	Arsenic
GH-2191	Bogoso Bogomo mine	5.43	-2.16	Artisanal Mining (hand mining)	Mercury - elemental
GH-2192	Dompoase W A E, Western Region	5.9833	-2.0167	Artisanal Mining (hand mining)	Mercury - elemental
GH-2193	Manso- Fawotrikye mine, Ashanti Region	6.4	-1.8667	Artisanal Mining (hand mining)	Mercury - elemental
GH-2194	Asaman kakraba, Tarkwa, Western Region	5.333	-1.9833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2195	Abandoned Mercury site,Asaaman-Juaso	6.3833	-0.3833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2196	Teleku Bokazo mine	4.9722	-2.3203	Artisanal Mining (hand mining)	Mercury - elemental
GH-2199	Dunkwa-On-Offin, Central Region	5.9667	-1.7833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2215	Tebe-Tarkwa mine	5.3	-1.9833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2216	Kumasi E-Waste Recycling	6.6833	-1.6167	E-waste recycling	Lead
GH-2223	Aboabo river	6.446477	-1.9487	Industrial Estate (mixed industries)	Other
GH-2224	Suame garages	6.722575	-1.644473	Recycling / Recyclers (including salvage yards)	Other
GH-2225	United Nations Millennium Villages Project site, (Amansie)	6.446397	-1.9487	Artisanal Mining (hand mining)	Mercury - elemental
GH-2226	Amansie mines	6.716522	-1.622629	Mining and Ore Processing	Cyanide
GH-2229	Bogoso Ayanfuri mine	5.5667	-2.0167	Mining and Ore Processing	Mercury - elemental
GH-2241	Dumasi mine	5.5667	-2.0167	Artisanal Mining (hand mining)	Mercury - elemental
GH-2242	Nakabah mine	5.4333	-2.15	Artisanal Mining (hand mining)	Mercury - elemental
GH-2243	Fumbisi Builsa district mine	10.4333	-1.3333	Artisanal Mining (hand mining)	Mercury - elemental

Site Number	Site Name	Latitude		Site Industry	Key Pollutant
	Kadema- Ruilsa	Lande	Longitude	Artisanal Mining	rtoy i oliutant
GH-2244	district	10.5833	-1.2333	(hand mining)	Mercury - elemental
GH-2249	Ataaso Kotokuom 'World Bank' mine, A/R	6.6	-2.1167	Artisanal Mining (hand mining)	Mercury - elemental
GH-2250	Dokyiwa Obuasi mine	6.2	-1.6667	Artisanal Mining (hand mining)	Mercury - elemental
GH-2251	Sansu Obuasi mine	6.2	-1.6667	Artisanal Mining (hand mining)	Mercury - elemental
GH-2252	Anwiam Obuasi, Ashanti Region	6.2	-1.667	Mining and Ore Processing	Mercury - elemental
GH-2279	Former Adenta Mobil Service Station	5.7	-0.1667	Multiple Diverse Industries	PAH (Total)
GH-2280	Former GOIL Filling Station, Banana Inn	5.55	-0.2167	Transportation (bus stations, rail vards)	PAH (Total)
GH-2288	Mantraim mine site	5.3	-2.0167	Artisanal Mining (hand mining)	Mercury - elemental
GH-2289	Breman Gold Dredge mine	6.722575	-1.644473	Artisanal Mining (hand mining)	Mercury - elemental
GH-2291	Daboase Mpohor Wassa East mine	5.35	-1.6833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2292	Prestea-Himan mine	5.4333	-2.15	Artisanal Mining (hand mining)	Mercury - elemental
GH-2293	Dompoase (Adansi North) Kumasi	6.3	-1.5333	Artisanal Mining (hand mining)	Mercury - elemental
GH-2298	Daman Rex Bippo mine	5.5167	-1.8333	Mining and Ore Processing	Mercury - elemental
GH-2299	Daman Cinnamon Bippo mine	5.5167	-1.8333	Artisanal Mining (hand mining)	Mercury - elemental
GH-2308	Brumase Prestea	5.4333	-2.15	Mining and Ore Processing	Mercury - elemental
GH-2309	Konongo, Ashanti Region	6.6167	-1.2167	Artisanal Mining (hand mining)	Mercury - elemental
GH-2310	Odumase Asante- Akyem North mine	6.6167	-1.2333	Artisanal Mining (hand mining)	Mercury - elemental
GH-2311	Nangodi mine, U E R	10.8578	-0.6711	Artisanal Mining (hand mining)	Mercury - elemental
GH-2314	Sakamraso Brong Ahafo mine	6.9667	-2.3833	Artisanal Mining (hand mining)	Mercury - elemental
GH-2315	Bolaekyire Prestea mine	5.4333	-2.15	Artisanal Mining (hand mining)	Mercury - elemental
GH-2316	Prestea Bungalow Number 4	5.4333	-2.15	Artisanal Mining (hand mining)	Mercury - elemental

Site	Otto Nierro	Latituda	La constructa	Otto Industria	Key Dellutert
reamun	Site Name	Latitude	Longitude		key Pollutant
011 0047	Tuapim Prestea	F 4000	0.45	Artisanai wining	Manager alamantal
GH-2317	mine	5.4333	-2.15	(hand mining)	Mercury - elemental
	Bole-Kui, Bole-	0 0000	0.4000	Artisanal Mining	Maria a statementati
GH-2318	Bambol district, N/R	9.0333	-2.4833	(nand mining)	Mercury - elemental
011 00 44	Kookoase- Heman,	E 4 E	0.4000	Artisanal Mining	
GH-2341	Wassa Flase	5.45	-2.1333	(nand mining)	Mercury - elemental
	Prestea Dumasi				
011 00 40	Site, Ankobra basin,	E 4000	0.45	Artisanal Mining	Maraumi alamantal
GH-2342	W/R	5.4333	-2.15	(nand mining)	Mercury - elemental
011 00 40	Sekyere-Himan	<b>F</b> 0	4 0000	Artisanal Mining	Manager alamaantal
GH-2343	Wassa Flase mine	5.3	-1.9833	(nand mining)	Mercury - elemental
011 00 4 4	Bontoware-Himan,	E 4E	0.4000	Mining and Ore	
GH-2344	Wassa Flase mine	5.45	-2.1333	Processing	Mercury - elemental
					PCBS
	ECG Central Station		0.04.07	Electricity Distribution	(PolyChlorinated
GH-2395	G (Makola), Accra	5.55	-0.2167	Electricity Distribution	Bipnenyis)
	Abandoned Arsenic			Chemical	
	site, Abuakwa			Manufacturing (acids,	
	Formulation Plant,	0 70007	4 70005	organics, base	Lead
GH-2396		6.70397	-1.70965	cnemicais)	Lead
	Anamon Tannery,	7 5000	4 0000	Tanaan (On anationa	Ohmensium (Tetal)
GH-2397	Techiman, B/A	7.5833	-1.9333	Tannery Operations	Chromium (Total)
011.0407	Bolgatanga mine,	10 7050	0.0514	Artisanal Wining	Maraum, alamantal
GH-2407		10.7850	-0.8514	(nand mining)	Mercury - elemental
	Biblani Mawaabilaram			Mining and Ore	
	Wastern Region	6 4667	0 0000	Processing	Cuanida
GH-2406	Obstan	0.4007	-2.3333	Articopol Mining	Cyanide
	Opolari SouthNikroppit mino	6 4000	0 0000	(hond mining)	Maraury, alamantal
GH-2412	Southinklanpit mine	0.4333	-2.3333	(nand mining) Mining and Ora	Mercury - elemental
CH 2412		E 1000	0.15	Recording	Cuanida
GH-2413		5.4333	-2.15	Mining and Ora	Cyanide
	Obuasi Odumase	6.0	1 667	Mining and Ore	Maraury alamantal
GH-2414		0.2	-1.007	Articenel Mining	Mercury - elemental
	Obuasi renaso	6.0	1 6667	(hand mining)	Maraury, alamantal
GH-2415	Kanyani Mtatarana	0.2	-1.0007		Mercury - elemental
	Renyasi Nioloroso,	6 0667	2 2022	(hond mining)	Maraury, alamantal
GH-2410		0.9007	-2.3033		Mercury - elemental
CH 2447	Ayamun mine,	5 5667	2 0167	(hand mining)	Moroury clomontal
GU-7411	Obonomosi	0.0007	-2.0107	(nanu mining)	mercury - elemental
	Konongo Ashanti			Mining and Ora	
CH 2449	Ronongo, Ashanti Rogion	6 6667	1 1667	Processing	Cyanida
011-2410	Abandanad Maraumi	0.0007	-1.1007	Articopol Mining	Cyalline
		6 449755	0 02222	Anisanal Wining	Moroury organia
GH-2421	site, noyem Birim	0.440/55	-0.93323	(nano mining)	wercury - organic

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
	North, E/R				
	Badukrom mine,			Artisanal Mining	
GH-2428	Western Region	6.35	-2.2833	(hand mining)	Mercury - elemental
	Benso Tarkwa				
	Nsuaem, Western			Artisanal Mining	
GH-2439	Region	5.3	-1.9833	(hand mining)	Mercury - elemental
	Apedwa Kyebi				
	Mercury site, Birim,			Artisanal Mining	
GH-2441	E/R	5.65	-1.9833	(hand mining)	Mercury - elemental
	Bogoso Junction -			Antiona al Máisia a	
011.04.40	Tamso mine,		2.0467	Artisanal Wining	Maraum, alamantal
GH-2442	Western Region	5.5007	-2.0107		wercury - elemental
CH-2462	Tarkwa mino	53	-1 0833	(hand mining)	Cyanida
GI 1-2402	Feegman-Tarkwa	5.5	-1.9055	Artisanal Mining	Cyaniue
GH-2463	mine	4 9981	-2 0814	(hand mining)	Cvanide
0112400		4.0001	2.0014	Artisanal Mining	Oyaniac
GH-2464	Simpa Tarkwa mine	5.3	-1.9833	(hand mining)	Cvanide
0112101	Bibiani Central	0.0	1.0000	Mining and Ore	Cyanao
GH-2465	African Gold mine	6.4667	-2.3333	Processing	Cvanide
	Legacy Mercury				
	site, Ntronang			Mining and Ore	
GH-2466	Abirem, E/R	6.4333	-0.95	Processing	Mercury - elemental
	Subinso-Tepa mine,				
	Ahafo Ano North,			Mining and Ore	
GH-2467	A/R	7	-2.1667	Processing	Mercury - elemental
	Obuasi Pompora			Multiple Diverse	
GH-2490	STP	6.2	-1.667	Industries	Arsenic
	Abandoned Lead				
	site, Railway			The second second second	
011.0404	Servicing workshop,	0.00074	4 04005	Transportation (bus	
GH-2491	Kumasi	6.69071	-1.61835	Stations, rail yards)	Lead
CH-2576	Trootmont	6 1667	-0.55		Fluoridos
GH-2570	Abandoned	0.1007	-0.55		FIUUTIUES
	Pesticide site Vea				
	Irrigation Project			Artisanal Mining	
GH-2577	UE/R	10.8667	-0.85	(hand mining)	DDT
	Abandoned				
	Pesticides site.				
	Tono Irrigation				
GH-2578	Project, UE/R	9.4333	-0.0167	Agriculture	DDT
GH-2608	Sansu Obuasi-River	6.2	-1.6667	Mining and Ore	Cyanide

Site	Site Name	Latituda	Longitude	Site Industry	Key Pollutant
Number	Nyam	Lalluue	Longitude	Processing	Rey Follutarit
	Obuasi Ashanti			Mining and Ore	
GH-2649	Region	62	-1 6667	Processing	Lead
0112010	Old Aboabo	0.2	1.0007	1 100000mig	2000
	Kumasi Ashanti			Industrial/Municipal	
GH-2650	Region	6 6833	-1 6167	Dump Site	Cadmium
0112000	rtogion	0.0000	1.0107	Multiple Diverse	Oddinidin
GH-2676	River Subin, Kumasi	6.6833	-1.6167	Industries	Lead
011 201 0	Suame Magazine	0.0000			2000
	Industrial				
	Development.			Industrial Estate	
GH-2708	Kumasi	6.6833	-1.6167	(mixed industries)	Lead
				Industrial/Municipal	
GH-3132	Kpone Dump Site	5.70896	0.021618	Dump Site	Chromium (Total)
	kpone dumpsite,			Industrial/Municipal	
GH-3133	kpone	5.70896	0.021618	Dump Site	Other
	Kpone Waste Dump			Industrial/Municipal	
GH-3134	site, Tema	5.75	0.006944	Dump Site	Lead
	Lead site, Suame				
	Artisanal Cluster,			Industrial Estate	
GH-3136	Kumasi	6.75	-1.7	(mixed industries)	Lead
	Closed Lead site,				
	Butuah Lagoon,			Industrial Estate	
GH-3164	NewTakoradi	4.8833	-1.75	(mixed industries)	Lead
	Abandoned Mercury				
	site, PSGL Old			Mining and Ore	
GH-3185	Storage, Prestea	5.4333	-2.15	Processing	Mercury - elemental
	Abekoase, Tarkwa-				
	Nsuaem			Mining and Ore	
GH-3186	municipality	5.373333	-2.018611	Processing	Lead
	Teberibie mine				
	waste dump,				
	Tarkwa-Nsuaem			Mining and Ore	
GH-3188	municipality	5.286944	-1.998611	Processing	Arsenic
	Abandoned Mercury				
	site, Bondaye Old		o / =	Mining and Ore	
GH-3189	Storage, W/R	5.4166	-2.15	Processing	Mercury - elemental
011.0040	Ayigya industrial	0 700	4 505	Industrial/Municipal	
GH-3213	waste site	6.703	-1.565	Dump Site	Lead
	Amakom Auto-				
				Tropoportation (hus	
	Asare Park)near	6.67	1 507	nansponation (bus	Lood
GH-3214		0.07	-1.597	stations, rail yards)	Leau

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
GH-3215	Odumase Zongo (Asante Akyem North Municipality)	6.625933	-1.231217	Artisanal Mining (hand mining)	Mercury - organic
GH-3259	Lead Acid Battery Recycling, Ntiribuoho, Afigya Kwabre District	6.7855	-1.6627	Lead - Battery Recycling	Lead
GH-3260	Dump site, Ahenema Kokoben, Bosomtwe District	6.6308	-1.6486	Industrial/Municipal Dump Site	Lead
GH-3262	Scrap Yard and Lead Acid Battery Recycling, Adiembra, Offinso District	6.95	-1.688	Recycling / Recyclers (including salvage yards)	Lead
GH-3263	Dantin cocoa office, Offinso District	6.9362	-1.6751		Pesticides
GH-3269	Konongo Zongo (Asante Akyem North Municipality)	6.621117	-1.216217	Artisanal Mining (hand mining)	Mercury - elemental
GH-3274	Abandoned Ghana Lead Acid Battery Factory, Adukrom	6.011297	-0.080386	Lead - Battery Recycling	Lead
GH-3280	Manhyia reclaimed landfill site	6.715647	-1.635833	Industrial/Municipal Dump Site	Lead
GH-3283	Artisanal gold mining, Kibi Anglican Basic School	6.156667	-0.56125	Artisanal Mining (hand mining)	Mercury - elemental
GH-3284	abandoned Kibi Divisional Police Mercury contaminated site- Kibi 2	6.154067	-0.558292	Artisanal Mining (hand mining)	Mercury - elemental
GH-3293	Asafo Garages	6.072278	-1.612194	Lead - Battery Recycling	Lead
GH-3294	Club 600 suame Garages	6.715639	-1.630583	Lead - Battery Recycling	Lead
GH-3317	New Konkrompe Dam, Atebubu- Amantin District	7.71294	-1.01525	Agriculture	Chlordane
GH-3319	Atebubu Magazine, Atebubu Amantin District	7.76317	-0.98386	Multiple Diverse Industries	Lead

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
GH-3320	Atebubu-Prase, Atebubu- Amantin District Assembly Battery Recycling	7,752111	-0.986806	Lead - Battery Recycling	Lead
GH-3321	Yeji Magazine, Pru District	8.229472	-0.650944	Industrial Estate (mixed industries)	Lead
GH-3327	Abandoned Mercury site, Nyafoman, E/R	6.4429	-0.9123	Artisanal Mining (hand mining)	Mercury - organic
GH-3332	Asokwa Cluster of Auto mechanic shops	6.773	-1.588	Lead - Battery Recycling	Lead
GH-3335	Oblogo Municipal Landfill site	5.56912	-0.32236	Industrial/Municipal Dump Site	Other
GH-3336	Tailings dam, Akusu River, Saamang Fanteakwa	6.324525	-0.499389	Mining and Ore Processing	Mercury - elemental
GH-3337	Poloyela Fong Community Blacksmith, Tamale	9.4094	-0.8459		Lead
GH-3338	Aboabo Kesse, reclaimed landfill , Kumasi	6.809	-1.608	Industrial/Municipal Dump Site	Lead
GH-3339	Kaase dump site, Kumasi, Ashanti Region.	6.682	-1.656	Industrial/Municipal Dump Site	Lead
GH-3340	Buokrom/ Sepe,Kumasi, Ashanti Region	6.83	-1.71	Industrial/Municipal Dump Site	Lead
GH-3341	Kenyasi (Truba),Kumasi Ashanti Region Landfill Site	6.815	-1.597	Industrial/Municipal Dump Site	Lead
GH-3342	Buokrom/ Doti,Kumasi, Ashanti Region	6.74316	-1.57254	Industrial/Municipal Dump Site	Lead
GH-3343	Abandoned Lead Site, Aluminum Enterprises Limited	5.68525	0.03598	Lead Smelting (with ingot production)	Lead
GH-3359	Valco Industrial Waste Dumpsite	5.6723	0.02714	Heavy Industry (casting, rolling, stamping)	Other
GH-3360	Cape Coast Siwdu e-waste site,	5.105392	-1.241806	E-waste recycling	Lead
GH-3361	Abandoned Arsenic	5.448541	-2.133436	Artisanal Mining	Arsenic

Site Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
	Site, Asesre-Prestea	Lando	Longitudo	(hand mining)	
GH-3363	Wyoming Mine, Abomosu	6.18221	0.42402	Artisanal Mining (hand mining)	Mercury - elemental
GH-3364	Ameen Sangari waste water disposal site, Cape Coast	5.119444	-1.283056	Industrial Estate (mixed industries)	Lead
CH 3365	Prestea-Himan Ntokonu gold washing and extraction site, Prostoa	5 255823	-1 003056	Artisanal Mining	Load
GH-3366	Birim river pollution, Akim Oda, Eastern region	5.936389	-0.979167	Artisanal Mining (hand mining)	Chromium (Total)
GH-3368	Abandoned Mining Site, Kibi Apapam	6.08721	0.35891	Artisanal Mining (hand mining)	Mercury - elemental
GH-3370	Bonsa Tyre Manufacturing, Wassa West District, Western province	5.283444	-1.983494	Heavy Industry (casting, rolling, stamping)	Lead
GH-3371	Bremang lead-acid recycle legacy	6.7453	-0.643	Lead - Battery Recycling	Lead
GH-3372	Nkroful Small Scale Mining, Ellembelle District	4.950081	-2.316747	Mining and Ore Processing	Lead
GH-3373	Abandoned Shang Feng Mining Site, Akyem Soabe, Eastern Province	5.997064	-0.918764	Mining and Ore Processing	Lead
GH-3374	Affiduasi small-scale blacksmith industry	6.8486	-1.4013	Industrial Estate (mixed industries)	Lead
GH-3377	Fumesua, Abandoned fuel pump and Cluster of Automobile Artisans	6.712278	-1.524083	Multiple Diverse Industries	Lead
GH-3378	Ejura Cluster of Artisans, Ejura Sekyeredumase District	7.37864	-1.360888	Multiple Diverse Industries	Lead
GH-3379	Meduma Cluster of Artisans, Asore Nkwanta, Ashanti	6.770972	-1.594722	Multiple Diverse Industries	Lead
GH-3381	Amanfrom Landfill	6.76275	-1.667944	Industrial/Municipal	Lead

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
	site			Dump Site	
	Hwiediem west			Recycling / Recyclers	
011 0000	polar tyre	0 700000	4 0005	(including salvage	
GH-3382	combustion site	6.762889	-1.6695	yards)	Lead
0110405	Takoradi Kokompe	4 9 9 9 9 9 4	4 707704	- ,	
GH-3405	scrap yard	4.888264	-1./6//81	E-waste recycling	Lead
	Korle Lagoon				
	Ecological				
011.044	Restoration Project,	E 500544	0.040700	Industrial/Municipal	
GH-341	Korie-Bu, Accra	5.536541	-0.219769	Dump Site	Lead
CU 2440	Mixed industries,	E 70000E	0.00004.0		
GH-3410	Ashiaman Filler line	5.700085	-0.033319	industries	Lead
	Abandoned				
	Aluminium Enterprises Limited			Load Smalting (with	
CH-3425	Sito Tomo	5 68525	0.03508	inget production)	Cyanida
011-3423	Mixed Industries	3.00323	0.03390		Cyaniue
	Adadaimkno			Multiple Diverse	
GH-3427	artisanal cluster	5 533/72	-0 216707	Industrios	Cadmium
011-0-27	Dongu Rivor	0.000472	-0.210707	industries	Caumum
GH-3429	Oblogo	5.550245	-0.316716	Aariculture	Cadmium
	Akvem Ankaase.			Artisanal Mining	
GH-3432	Eastern Region	6.22425	0.301	(hand mining)	Arsenic
	Valco Industrial			Heavy Industry	
	Waste Dumpsite,			(casting, rolling,	
GH-3434	Tema	5.6723	0.02714	stamping)	Cadmium
	Heavy Industrial				
	Area Municipal			Petrochemical	
GH-3435	Drain,Tema	5.66824	0.00214	Industries (refineries)	Arsenic
	Kokompe Auto				
	Spare Parts Shops/				
	Scrap Yard,			Multiple Diverse	
GH-3436	Darkuman	5.550245	-0.25005	Industries	Lead
	Abandoned Mercury			Artisanal Mining	
GH-3437	Site, Kibi Apapam	6.153638	-0.599772	(hand mining)	Arsenic
• · · • · • •	Oblogo Municipal			Industrial/Municipal	
GH-3438	Landfill site, Oblogo	5.933587	-0.533433	Dump Site	Lead
	Wyoming Mine,		-		
011.04/0	Abomosu, Eastern	5.549867	0.1805877	Artisanal Mining	
GH-3442	Region	999	69	(nand mining)	Arsenic
	Ho Dome scrap				
	yard, Ho Municinality	6.00	0.00405		Codminue
GII-3002	iviunicipality	0.30	-0.28495	⊢ -wasie recycling	Caumium

Site	Site Name	Latituda	Longitudo	Site Industry	Koy Pollutont
Number	Anointed Vessel	Lalluue	Longitude		Rey Pollulari
	Ratik Training Site				
GH-3513	Ho Fiave	6.37	-0 28963	Dve Industry	Lead
0110010	Tema Community 1	0.07	0.20000		2000
GH-3514	E-waste site.Tema	5.646	-0.00638	E-waste recycling	Arsenic
	Ho Zongo E-waste				
GH-3551	recycling, Ho	6.37971	-0.028849	E-waste recycling	Lead
	Akpenamawu E-			, j j	
GH-3552	waste recycling, Ho	6.37393	0.028075	E-waste recycling	Lead
	Volta Lake, Kokonte				
GH-3553	Kpedzi (Akosombo)	6.279	-0.0788	Dye Industry	Lead
GH-3554	Galloway, Accra	5.552	-0.2308	E-waste recycling	Lead
	Nungua Scrap Yard,				
GH-3555	Brigade Junction	5.592756	-0.091119	E-waste recycling	Lead
	Auto Mechanic				
0110504	Shop Madina-		0 4 5 0 0 0	I ransportation (bus	
GH-3564	Nsamanpomu Maahania Ohana	5.67664	-0.15362	stations, rail yards)	Lead
	Mechanic Shops,			Transportation (hus	
	Brusi Akrasi Obuggi Ashanti	6 011	1 676	transportation (bus	Lood
GH-3000	,Obuasi,Ashahii	0.211	-1.070	stations, rail yards)	Leau
	Central Ashanti			Industrial/Municipal	
GH-3569	Region	6 1 9 8	-1 665	Dumo Site	Lead
011 0000	Animal Hide	0.100	1.000		
	processing site				
GH-3571	Achimota	5.627778	-0.911111	Food Processing	Lead
	Tweapease mining			Artisanal Mining	
GH-3572	site, Obuasi.	6.165528	-0.678812	(hand mining)	Mercury - elemental
	Kofikrom landfill site,			Industrial/Municipal	
GH-3573	Obuasi.	6.196528	-0.248194	Dump Site	Mercury - elemental
	String of mechanic			Transportation (bus	
GH-3577	shops, Madina	5.683056	-0.156944	stations, rail yards)	Chromium (Total)
<b>•</b> ···•	Sanso Artisanal			Artisanal Mining	
GH-3579	Mining Site	6.151233	-1.692533	(hand mining)	Mercury - organic
	akim wenchi				
	abandoned	5 004 000	0.0005	Mining and Ore	
GH-3580	galamsey site	5.991389	-0.9025	Processing	Lead
	Auto Dattery			Lood Pottony	
CH-3581	Atebubu	7 752111	-0.086806	Recycling	Lead
01-001	Ridieso Abandoned	1.132111	-0.300000	Recycling	Leau
	Artisanal Mining			Artisanal Mining	
GH-3582	Site. Obuase	6.2028	-1.674167	(hand mining)	Mercury - elemental
GH-3583	Adikra Artisanal	6.085616	-1.697336	Artisanal Mining	Mercury - organic

Site	Olto Marra	Latitude	La se situada	Otto ha dura ta u	Kara Dallutarat
Number	Site Name Mining Site	Latitude	Longitude	Site industry	Key Pollutant
	Artisanal gold			(nanu mining)	
GH-3584	mining at Goldfields Int. School, Bondaye - Prestea	5.24812	-2.0934	Artisanal Mining (hand mining)	Arsenic
GH-3585	Informal Mercury Mining - Kporviadzi, Prestea	5.2652	-2.07141	Artisanal Mining (hand mining)	Mercury - elemental
GH-3740	Atwima Boko, Atwima Nwabiagya Disrtict	6.67205	-1.69988	Pesticide Manufacturing	Endrin
GH-3798	Abandoned Mobil Filling Station - Denu	6.06083	-1.08862	Petrochemical Industries (refineries)	Lead
GH-3799	Abandoned Runel Filling Station - Dzodze	6.14092	-0.59591	Petrochemical Industries (refineries)	Lead
GH-3800	Defunct Gadzanku Gas Station - Ho	6.36801	-0.29311	Petrochemical Industries (refineries)	Lead
GH-3801	Mazeema leather tanning	9.39356	-0.83981	Tannery Operations	Chromium (Total)
GH-3812	abandoned tyre burning centre for slaughtering animals, madina	5.682778	-0.157222	Recycling / Recyclers (including salvage yards)	Chromium (Total)
GH-3813	abandoned slaughter house, koforidua zongo magazine	6.101667	-0.260833	Agriculture	PCBs (PolyChlorinated Biphenvls)
GH-3814	Kasoa Tyre Burning Site and abbator	5.571389	-0.96139	Recycling / Recyclers (including salvage yards)	Lead
GH-3815	Abandoned Filling Station at Adenta	5.705833	-0.155	Transportation (bus stations, rail vards)	Cadmium
GH-3819	Sakaman Tyre Burning Site and Abbator	5.548611	-0.601667	Recycling / Recyclers (including salvage yards)	Lead
GH-3820	Waste oil recycling site, Tema heavy Industrial area	5.546944	-0.308889	Recycling / Recyclers (including salvage yards)	Lead
GH-3821	Abandoned fuel service station, Winneba	5.415	-0.745	Petrochemical Industries (refineries)	Lead
GH-3822	ECG Repair and	5.546944	-0.208889	Electricity Distribution	PCBs

Site					
Number	Site Name	Latitude	Longitude	Site Industry	Key Pollutant
	Maintenance Workshop, Makola				(PolyChlorinated Biphenyls)
GH-3824	Abandoned fuel service station, Kormantse	5.203103	-1.087861	Transportation (bus stations, rail yards)	Lead
GH-3825	Ashaiman tyre burning site, Peterline	5.669403	-0.018558	Recycling / Recyclers (including salvage yards)	Lead
GH-3833	Cluster of Artisanal Tannery	9.3936	-0.83982	Tannery Operations	Chromium (Total)
GH-3835	Asante King's Project battery recycling site	6.701522	-1.624604	Lead - Battery Recycling	Lead
GH-3889	Abandoned abattoir, James Town	5.543472	-0.204117	Aariculture	Lead
GH-4220	Nmai Dzorn Transformer sites 1 and 2. East Legon	5.65987	-0.132232	Electricity Distribution	PCBs (PolyChlorinated Biphenvls)
GH-4221	Madina Zongo Transformer site, Libya Quarters	5.68277	-0.168889	Electricity Distribution	PCBs (PolyChlorinated Biphenyls)
GH-4222	Lakeside Metal Fabricators, Ashaley Botwe	5.685	-0.1411	Electroplating	PCBs (PolyChlorinated Biphenyls)
GH-4224	East Legon ECG Transformer Site, Bondzie Street	5.65987	-0.132232	Electricity Distribution	PCBs (PolyChlorinated Biphenyls)
GH-4225	Nungua E-waste Site, Teshie Nungua	5.596852	-0.0845	E-waste recycling	PCBs (PolyChlorinated Biphenyls)
GH-5210	Abandoned chemical manufacturing plant, Abuakwa	6.70397	-1.70965	Chemical Manufacturing (acids, organics, base chemicals)	Other
GH-5225	Abandoned mine pit, Manso Adubia	6.40029	-1.93925	Artisanal Mining (hand mining)	Arsenic
GH-5226	Abandoned mine pit, Afraso	6.30583	-1.97697	Artisanal Mining (hand mining)	Arsenic
GH-5227	Abandoned mine pit, Tontokrom	6.25451	-2.00261	Artisanal Mining (hand mining)	Arsenic
GH-5228	Abandoned mine pit, Kwahu	6.45248	-1.89953	Artisanal Mining (hand mining)	Arsenic
GH-5237	PSGL Tailing Dump Site, Bondaye	5.39745	-2.1679	Artisanal Mining (hand mining)	Arsenic

Site	Cite Name	Latituda	Longitudo		Kay Dallutant
Inumper	Site Name	Latitude	Longitude	Site industry	Key Pollutant
	Abrogari Small				
011 50 40	Scale Artisanal	6.184246	1.2/44140	Artisanal Mining	
GH-5243	Mining Site	161	63	(hand mining)	Arsenic
	Artisanal gold				
	mining at Goldfields				
	Int. School,			Artisanal Mining	
GH-5244	Bondaye - Prestea	5.41943	-2.14808	(hand mining)	Arsenic
	PSGL Old Dump				
	Site II (Abandoned			Mining and Ore	
GH-5252	Mercury Site)	5.44525	-2.12921	Processing	Arsenic
	Abandoned Mercury				
	Site at Asesre -			Artisanal Mining	
GH-5253	Updated	5.44419	-2.15213	(hand mining)	Arsenic
	Abandoned Mercury				
	site, Adadiantem			Artisanal Mining	
GH-5262	Habitat, Kibi	6.168329	-0.567685	(hand mining)	Arsenic
	Prestea Ankobrah			Artisanal Mining	
GH-5263	Mine Site	5.44907	-2.12418	(hand mining)	Arsenic
	Abandoned Mercury				
	Site, Bondaye -			Mining and Ore	
GH-5266	Updated	5.40261	2.15	Processing	Arsenic

#### Ghana UNIDO sites

Site ID	Site Name	Latitude	Longitude	Key Pollutant	Site Industry
GH- 2396	Abandoned Arsenic site,Abuakwa Formulation Plant, Kumasi	6.70397	-1.70965	Lead	Chemical Manufacturing (acids, organics, base chemicals)
GH- 2491	Abandoned Lead site, Railway Servicing Workshop, Kumasi	6.69071	-1.61835	Lead	Transportation (bus stations, rail yards)
GH- 3274	Abandoned Ghana Lead Acid Battery Factory, Adukrom	6.011297	-0.080386	Lead	Lead - Battery Recycling
GH- 3342	Buokrom/ Doti,Kumasi, Ashanti Region	6.74316	-1.57254	Lead	Industrial/Municipal Dump Site
GH- 5210	Abandoned chemical manufacturing plant, Abuakwa	6.70397	-1.70965	Other	Chemical Manufacturing (acids, organics, base chemicals)
GH- 5225	Abandoned mine pit, Manso Adubia	6.40029	-1.93925	Arsenic	Artisanal Mining (hand mining)
GH- 5226	Abandoned mine pit, Afraso	6.30583	-1.97697	Arsenic	Artisanal Mining (hand mining)
GH- 5227	Abandoned mine pit, Tontokrom	6.25451	-2.00261	Arsenic	Artisanal Mining (hand mining)
GH- 5228	Abandoned mine pit, Kwahu	6.45248	-1.89953	Arsenic	Artisanal Mining (hand mining)
GH- 5237	PSGL Tailing Dump Site, Bondaye	5.39745	-2.1679	Arsenic	Artisanal Mining (hand mining)
GH- 5243	Abrogari Small Scale Artisanal Mining Site	6.184246161	1.274414063	Arsenic	Artisanal Mining (hand mining)
GH- 5244	Artisanal gold mining at Goldfields Int. School, Bondaye - Prestea	5.41943	-2.14808	Arsenic	Artisanal Mining (hand mining)
GH- 5252	PSGL Old Dump Site II (Abandoned Mercury Site)	5.44525	-2.12921	Arsenic	Mining and Ore Processing
GH- 5253	Abandoned Mercury Site at Asesre - Updated	5.44419	-2.15213	Arsenic	Artisanal Mining (hand mining)
GH- 5262	Abandoned Mercury site, Adadiantem	6.168329	-0.567685	Arsenic	Artisanal Mining (hand mining)

	Habitat, Kibi				
GH-	Prestea Ankobrah	5.44907	-2.12418	Arsenic	Artisanal Mining (hand mining)
5263	Mine Site				
GH-	Abandoned Mercury	5.40261	2.15	Arsenic	Mining and Ore Processing
5266	Site, Bondaye -				
	Updated				

# **APPENDIX 3 - AGBOGBLOSHIE SOIL SAMPLING**

Spot Number	1		2		3		4		
Longitude	05.55443	₿°N	05.55413	05.55413⁰N		05.55373°N		05.55340°N	
Latitude	00.22575	S℃	00.22606	°₩	00.22656	8°W	00.22682	2ºW	
	Value		Value		Value		Value		
Elements	Surface	3.6	Surface	3.6	Surface	3.6	Surface	3.6	
		Inches		Inches		Inches		Inches	
		Beneath		Beneath		Beneath		Beneath	
Ti					2504				
Fe	8832		15587		7336		11536		
Zn	200		353		1295		313		
Pb	56		137		469		170		
Rb	12		200		32		53		
Sr	60		73		641		215		
Zr	134		202		302		255		
Mn			159		597		199		
As					99		169		
Cu			93		644				
Со							242		
Cr									
Sn					162				
Sb					124				
Ва									
Ni									
Mo									

Spot Number	5		6		7		8	
Longitude	05.55286	δ°N	05.55227⁰N		05.55247ºN		05.55220⁰N	
Latitude	00.22733	8⁰W	00.22774ºW		00.22753	8⁰W	00.22779	9ºW
	Value		Value		Value		Value	
Elements	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath
Ti	4440		1924			2397	1463	2136
Fe	18192		15499		12225	14406	17161	36958
Zn	430		384		170	66	242	
Pb	171		90		39	22	182	413
Rb	73		35		22	21	14	
Sr	176		197		83	39	156	183
Zr	220		323		301	278	346	189
Mn	240		244		610		186	
As								86
Cu	188		114			542	42	932
Со					6517			
Cr								
Sn								
Sb								
Ba								
Ni								
Mo								

Spot	9		10		11		12	
Number								
Longitude	05.55185⁰N		05.55121⁰N		05.55061 °N		05.55005°N	
Latitude	00.22812	2 ºW	00.22734ºW		00.22671ºW		00.22621°W	
	Value		Value		Value		Value	
Elements	Surface	3.6	Surface	3.6	Surface	3.6	Surface	3.6
		Inches		Inches		Inches		Inches
		Beneath		Beneath		Beneath		Beneath
Ti	2509	3146			1454	2905	2941	
Fe	19486	6014	7341	6628	9259	16634	15086	3529
Zn	123	7063	411	894	202	146	1196	732
Pb	93	2734	103	104	179	84	1458	29
Rb	42	51	17		29	32	42	134
Sr	99	70	87	76	137	90	113	
Zr	283		175	227	167	306	443	131
Mn						231	219	181
As	54	6996						
Cu		416	56		138		1294	535
Со								
Cr		577						
Sn		666					300	
Sb							162	
Ва								
Ni								

Spot Number	13		14		15		16	
Longitude	05.54964°N		05.55052°N		05.55156°N		05.55253°N	
Latitude	00.22567	70W	00.22527ºW		00.22513ºW		00.22482°W	
	Value		Value		Value		Value	
Elements	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath
Ti	4048	3882	3524		2132	6983	6476	7030
Fe	>10%	21050	16742		19480	41304	>10%	>10%
Zn	1156	287	14409		15122	95256	4794	2345
Pb	301	100	868		63	43367	1665	1092
Rb	31	34	46		80		143	131
Sr	109	84	52		55	2466	216	152
Zr	294	360	246		274		1417	97
Mn			268		326		927	1396
As	419						143	100
Cu	2446		2797		74	772	2583	3506
Co			337		343	2535		
Cr								
Sn							343	226
Sb			366			350	290	456
Ва								2087
Ni								211
Мо								28

Spot Number	17		18		19		20	
Longitude	05.55278⁰N		05.553626°N		05.55375°N		05.55403ºN	
Latitude	00.22445	5°W	00.22403°W		00.22459°W		00.22505°W	
	Value	-	Value		Value		Value	
Elements	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath
Ti	8624	12734	3790	4246	2551	2729		
Fe	>10%	27996	38142	18002	21961	8425	34988	25497
Zn	2126	2099	644	847	326		324	833
Pb	4000	9325	1354	725	124		268	609
Rb	35	95	19	50	300	19	15	29
Sr	906	2368	853	502	69	19	145	200
Zr	356	417	448	377	423	415	277	355
Mn	762	365	504	300	201		284	299
As	412		98					130
Cu	1326	3820	783	746	101		203	725
Со	1267							
Cr								
Sn		1279		278				
Sb	303	1622	230	188				
Ва				2604				
Ni								
Мо								

Spot Number	21		22		23		24	
Longitude	05.55403°N		05.55366⁰N		05.55337°N		05.55302°N	
Latitude	00.24459°W		00.225251°W		00.22551°W		00.22600°W	
	Value		Value		Value		Value	
Elements	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath	Surface	3.6 Inches Beneath
Ti	3758		2833	2055	2135	3453	20048	25186
Fe	32627		60120	14177	38574	>10%	171	279
Zn	1844		858	108	768	985	1118	197
Pb	240		872	48	265	497	18	17
Rb	18		28	30	18	19	37	44
Sr	143		130	58	204	124	151	350
Zr	261		210	366	191	205		
Mn	405		625	265	294			
As							411	192
Cu	237		624		11490	1290		
Со								
Cr								

Spot Number	29		30		31			
Longitude	05.55195°N		05.552480°N		05.555368°N			
Latitude	00.22574	1ºW	00.22544°W		00.22593°W			
	Value		Value		Value		Value	
Elements	Surface	3.6	Surface	3.6	Surface	3.6	Surface	3.6
		Inches Beneath		Inches Beneath		Inches Beneath		Inches Beneath
Ti	6080	2156	2566	2619	3748	3066		
Fe	86393	13952	17356	19357	22063	1959		
Zn	1568	232	436	188	157	419		
Pb	795	348	103	42	141	578		
Rb	26	13	26	16	41	31		
Sr	120	108	157	287	65	68		
Zr	290	136	309	142	61	294		
Mn	588			261	283	274		
As								
Cu	3492	1719	353	52	150	359		
Со	851							
Cr								
Sn	233							
Sb	186							
Ва								
Ni								
Мо								

Spot	25		26		27		28	
Inumber	05 55072001		05 552260N					
Longitude	U5.55273"N		05.552501N		05.551775N		05.55209°N	
Latitude	00.22640	٥W	00.22681ºW		00.22683ºW		00.22622ºW	
	Value		Value		Value		Value	
Elements	Surface	3.6	Surface	3.6	Surface	3.6	Surface	3.6
		Inches		Inches		Inches		Inches
		Beneath		Beneath		Beneath		Beneath
Ti	5459	5153	5763		12087			9147
Fe	71448	37486		27832			17341	17961
Zn	1711	1386	410	235	314		363	413
Pb	1382	561	242	89	222		319	192
Rb	84	42	30	16	29		300	21
Sr	289	159	55	101	81		218	149
Zr	311	197	374	327	439		327	173
Mn	364		388				272	265
As				152	39			32
Cu	1364	1416	305		340		300	164
Со								
Cr	357							
Sn								
Sb	285	256	59629					
Ва								
Ni								
Мо								