Environmental Impact Assessment
for
El Mahy Secondary Lead Smelter

December 18, 2005

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The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

ACRONYMS

ASU-RL	Ain Shams University- Reference Laboratory
AQMC	Air Quality Monitoring Component
BHHRA	Baseline Human Health Risk Assessment
CAA	Competent Administrative Authority
CAIP	Cairo Air Improvement Project
Chemonics	Chemonics International
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EEAA	Egyptian Environmental Affairs Agency
EEPP	Egyptian Environmental Policy Program
EMP	Environmental Management Plan
EMRA	Egyptian Mineral Resources Authority
ER	Executive Regulations
ERP	Emergency Response Plan
GOE	Government of Egypt
GOQ	Governorate of Qalyoubia
HEPA	High Efficiency Particulate Air
HI	Hazard Index
IEUBK	Integrated Exposure Update BioKinetic
LEAP	Lead Exposure Abatement Plan
LIFE	Livelihood and Income From the Environment program
LSAP	Lead Smelter Action Plan
MSE	Millennium Science & Engineering, Inc.
PbB	Blood Lead Concentration
PM	Particulate Matter
RAGS	Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual, (Part A), Interim Final
RBRG	Risk-Based Remediation Goal
SAP	Sampling and Analysis Plan
SCEM	Site Conceptual Exposure Model
SFI	Inhalation Oral Slope Factor for carcinogenic chemicals
SFo	Oral Slope Factor for carcinogenic chemicals
URF	Unit Risk Factor
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency

Symbols for Metals

As	Arsenic
Cd	Cadmium
Cr	Chromium
Cu	Copper
Pb	Lead
Sb	Antimony
Se	Selenium
Zn	Zinc

Units of Measurement

m	meter
m^2	square meter
mg/kg	milligram per kilogram (parts per million)
$\mu g/ft^2$	microgram per square foot
µg/g	microgram per gram (parts per million)
mg/L	milligram per liter
µm	micrometer (micron)

EXECUTIVE SUMMARY

Millennium Science & Engineering, Inc. in association with Chemonics International (MSE/Chemonics) has prepared this Environmental Impact Assessment (EIA) for the Egyptian Environmental Affairs Agency (EEAA). The purpose of the EIA is to address the impacts associated with the remediation of El Mahy Smelter in Shoubra El Kheima, Qalyoubia. The EIA is being funded through the United States Agency for International Development's (USAID) Livelihood and Income from the Environment Program, Lead Pollution Clean-Up in Qalyoubia Project (LIFE-Lead).

Project Description

Lead contamination from secondary lead smelters in Shoubra El Kheima poses serious health threats to the people living and working near the former smelters. To address this problem, the USAID and the Government of Egypt (GOE) designed a lead clean-up component under LIFE. The goal of the project is to remediate lead pollution in five secondary lead smelter sites (i.e., Awadallah Nos. 1, 2, and 3, and the El Mahy and Seoudi Smelters) and the El Shahid Ahmed Shaalan School located near the lead smelters in Shoubra El Kheima.

The remediation of the lead smelters will result in reduced risks to human health and the environment by lowering lead contamination to acceptable levels. In addition to site remediation, the project includes activities in community involvement and public participation, communication, capacity building, and policy/legal support.

Several governmental and non-governmental entities are directly or indirectly involved in the implementation of the project activities. Governmental entities include the Egyptian Environmental Affairs Agency (EEAA), the Governorate of Qalyoubia (GOQ), and the Ministries of Health, Education, and Industry. Non-governmental organizations include Community Development Associations, the Integrated Care Society, the National Council for Women, the private sector, and the media.

This EIA focuses only on remediation of the El Mahy secondary lead smelter. The remediation design calls for remediation of buildings, structures and floors to levels equal to or less than the proposed baseline human health risk goals set by the project in cooperation with the EEAA. After remediation, the future use of the smelters sites will be safe for workers and occupants. In addition, lead pollution hazards will be significantly reduced for the people of Shoubra El Kheima.

Following the conduct of site characterization studies, a short list of remediation alternatives was developed.

Environmental Setting

The population in Hai Shark (East District) of Shoubra El Kheima increased from 454,000 in 1996 to 536,900 in 2001 with an annual population growth rate of 3.7 percent. This annual growth rate is higher than in other parts of Shoubra El Kheima, the GOQ, or in Egypt as a whole.

The population of concern is 182,096 residents in the study area, which is defined as a circle with a radius of one kilometer around the Awadallah Smelter No.1. The population inhabiting this area is distributed among four administrative subdistricts: Mostorod, Bahteem, Masaken El Amiria, and El Zawya El Hamra. Approximately 20 percent of the population in Mostorod, Bahteem, and El Zawya El Hamra and 80 percent of the population in Masaken El Amiria are located within the study area. Table 2.1 presents population estimates for the study area, including estimates for the children seven years old and under and the females of reproductive age sub-populations that are at highest risk from lead contamination.

The secondary lead smelter to be remediated are located in mixed industrial, residential, and agricultural land uses. The smelter is located within the Nile River flood plain. The topography of the area is almost flat with an average elevation of 17 meters above mean sea level. The climate of the site is considered arid with annual rainfall of approximately 25 millimeters per year.

The general area of the smelter is underlain by two hydrogeologic units, an upper silt and clay layer beneath which is an alluvial aquifer. The top of the water table is from five to six meters below the ground surface. The groundwater flow direction trends to the NNW consistent with the flow direction of the Ismailia Canal. Seasonal variations in flow direction are negligible as the canal is maintained at near the same level throughout the year. Generally, the aquifer in Shoubra El Kheima is used by local industries and is not a drinking source. Potable water is provided to the residents by the GOQ. The Ismailia Canal is a source of recharge to the aquifer as well as a source of drinking water in other areas of the GOQ.

Air pollution in Shoubra El Kheima is mainly a result of industrial activities and vehicle traffic. Particulate matter (PM) and lead monitoring results were obtained from 36 sites in the Greater Cairo metropolitan area from October 1998 to July 1999. The results indicated that the highest PM10, PM2.5, and lead concentrations were observed in the industrial areas of Shoubra El Kheima.

The project site is located within the urban landscape matrix of Greater Cairo, parallel to the Ismailia Canal. The project area, which can be considered as a man made environment, appears to have little ecological significance and low biodiversity due to the immense alteration of the natural ecology. The most important ecological feature is Ismailia Canal that runs as a corridor to the south of the project site.

Impact Assessment

The Government of Egypt (GOE) is currently developing an industrial relocation plan for industries located in residential areas that have a significant negative impact on public health and the environment. The project is consistent with those planning efforts, as the secondary lead smelters were some of the initial industries identified in the GOE industrial relocation plan. The remediation of the secondary lead smelters will have a positive impact on the residents of Shoubra El Kheima.

The remediation activities were found to have positive impacts relative to the following:

- Employment benefits for the local community during the period of site remediation.

- Initiation of new hazardous waste site remediation businesses.
- Improvement of the environmental quality (air, soil, and water quality) in the area, due to elimination of lead health exposure pathways.
- Improvement in the quality of life.
- Appreciation the value of land in Shoubra El Kheima.

Minimal or negligible negative impacts are expected in the following areas:

- Air Quality (Fugitive dusts and gaseous emissions).
- Noise.
- Traffic.
- Soil quality along transportation routes to disposal sites could be negatively impacted if transported waste is not properly covered.
- Potential risks to workers health and safety associated with remediation activities.

Surface, groundwater, and sediments samples taken within the vicinity of the smelter site tested for lead showed lead concentrations below the legal limits with the exception of one sample collected from a shallow monitoring well along the Ismailia Canal. Careful control of the remediation activities and periodic monitoring will ensure no alteration to such status.

No major negative impacts on natural, physical, or economic resources were identified during the development of this EIA. No cross-sectoral or cumulative impacts have been identified.

Comparison of Alternatives

The No-Action Alternative represents further increase in lead pollution hazards for the population of Shoubra El- Kheima and the environment. Exposure to lead contamination from secondary smelting may cause a wide variety of adverse health effects, ranging from reduction in the intelligence quotient of children to kidney cancer. Lead emissions are of particular concern for women of childbearing age and children under seven years of age. Children and young adults in areas that have been contaminated by smelter emissions can be exposed to lead through inhaling or ingesting dust and soil. Fugitive dust from the smelter and the surrounding area can be wind blown and deposited on uncovered food and water and subsequently ingested.

The project will improve air quality in Shoubra El Kheima through the removal of contaminated lead dust. Improvement of soil, and surface water and groundwater quality within the area will result from the remediation activities. In the absence of significant negative impacts, the proposed remediation actions will offer substantial benefits relative to the No-Action Alternative.

Management, Mitigation, and Monitoring

Mitigation measures will be developed to control potential negative impacts to the environment due to the remediation process. Mitigation measures may include the following:

- Dust generation control.
- Noise abatement.
- Onsite storage and handling of hazardous materials.
- Mitigate potential impacts on traffic through traffic control planning.
- Health and safety protection will be enforced on workers.

Monitoring of the following will be undertaken during the remediation activities:

- Air quality (ambient and workplace).
- Noise.
- Soil.
- Surface water and groundwater quality.

1. INTRODUCTION

1.1 Background

In 1994, a comparative risk analysis study, funded by the United States Agency for International Development (USAID) ranked lead contamination as one of Egypt's most serious environmental problems. Consequently, more effort was exerted to identify sources of human exposure to lead in Egypt and potential mitigation measures, the Lead Exposure Abatement Plan (LEAP), and to define activities to reduce the threat of secondary smelters, the Lead Smelter Action Plan (LSAP).

Beginning in 1997, the Cairo Air Improvement Program (CAIP), focused efforts on the area of Shoubra El Kheima by implementing the LSAP, relocating and upgrading smelters, supporting policy dialogue to reduce demand for lead-based products, and beginning to investigate contamination at smelter sites following relocation and closure. An early CAIP study indicated that there are 22 lead smelters only in the three Governorates of Cairo, Giza, and Qalyoubia, which represent the majority of secondary lead smelting operations in Egypt.

In addition, the Egyptian Environmental Policy Program (EEPP, 2003) addressed contaminated smelter sites, as well as prohibited smelting activities and forced proper smelter sites clean-up in Shoubra El Kheima. The investigations showed that, the Awadallah family owns several facilities in Shoubra El Kheima and is responsible for an estimated 65 percent of the national production. Lead smelter facilities in this neighborhood were also heavily contaminated with lead and other metals.

Lead concentrations of more than 60 percent by weight were found in some of the soil samples during CAIP investigations at an Awadallah site. In addition, the areas surrounding the smelter facilities, including nearby streets, play areas, homes, and other buildings, were heavily contaminated with lead and other metals. A health risk assessment and community health study to measure lead levels in blood demonstrated the severity of the problem. In the worst areas, 80 percent of the children and 100 percent of the adults had blood lead concentrations exceeding levels that are considered to be safe.

Given the substantial health threat posed by lead contamination in Qalyoubia and opportunities to involve the community in mitigating the problem, USAID designed a lead clean-up component under its Livelihood and Income from the Environment (LIFE) program.

1.2 LIFE-Lead Project

Lead contamination from secondary lead smelters in Shoubra El Kheima, Qalyoubia poses serious health impacts for the residents living near the smelters. To address this problem, the United States Agency for International Development (USAID) and the Government of Egypt (GOE) designed a lead clean-up component under the Livelihood and Income from the Environment Program (LIFE). The clean-up project is called LIFE Lead Pollution Clean-up in Qalyoubia (LIFE-Lead). The Life-Lead project is being implemented by Millennium Science & Engineering, Inc. in association with Chemonics International (MSE/Chemonics).

The goal of the project is to remediate lead pollution in five secondary lead smelter sites (Awadallah 1, 2, and 3, El Mahy, and Seoudi smelters) and El Shahid Ahmed Shaalan School located within the lead smelters area of Shoubra El Kheima. This will help reducing risks to

human health and the environment by lowering lead contamination to acceptable levels. In addition to site remediation, the project includes activities in community involvement and public participation, communication, capacity building, and policy/legal support.

Several governmental and non-governmental entities are directly or indirectly involved in the implementation of the project activities. Governmental entities include the Egyptian Environmental Affairs Agency (EEAA), the Governorate of Qalyoubia (GOQ), and the Ministries of Health, Education, and Industry. Non-governmental organizations include the Community Development Associations, the Integrated Care Society, the National Council for Women, the private sector, and the media.

1.3 Scope of the EIA

This Environmental Impact Assessment (EIA) focuses on the remediation activities that will take place in the El Mahy Smelter. A number of proposed remediation alternatives are compared with respect to their environmental impact in order to select the option with the least impacts and maximum long term benefits. The selected option is subjected to more detailed analysis with the aim of evaluating its potential environmental impact. In addition, a set of mitigation and monitoring measures are recommended to minimize the impact of the selected remediation alternative on the environment.

The assessment covers the proposed on-site clean up/remediation activities (e.g., structure cleaning, soil excavation outside the smelter sites); as well as the transportation of the generated waste to the appropriate waste disposal sites. The scope of the EIA does not include assessment of final waste disposal activities since the contaminated waste will be disposed in a licensed hazardous waste landfill and the non-contaminated waste will be disposed in a licensed sanitary landfill. These landfills are designed and managed according to the type of waste that they are licensed to receive.

This EIA involved a public consultation process, where the concerned stakeholders were consulted at the scoping stage to identify their concerns towards project implementation. All issues and concerns, relevant to the remediation activities, raised during public consultation were considered in the EIA.

2. PROJECT DESCRIPTION

2.1 Location of El Mahy Smelter

All of the sites that will be included in the Life-Lead remediation project are located near the southern border of the Qalyoubia Governorate in the Hai Shark (East District) of the City of Shoubra El Kheima as shown in Exhibit 2.1.

Exhibit 2.1: Locations of the Contaminated Sites under Investigation

2.2 Description of El Mahy Site

The El Mahy smelter is located on Tereet El Shaboura Street near the Ismailia Canal Road in a mixed residential and industrial area (Exhibit 2.2). The land was previously used as a brick factory. The northern border of the El Mahy site is bordered by El Ahleya Company for Pipe Manufacturing and Misr Company for Reinforced Concrete Works to the west. To the east, the site overlooks the North Cairo Mill. To the northeast there are newly established residential buildings.

The El Mahy Smelter property is approximately 1,600 m^2. Operations at the smelter started more than 25 years ago using two rotary furnaces, one vibratory furnace for smelting, three kettles for lead refining, and pipe extrusion equipment (Exhibit 2.3). The three smelting furnaces were fired by heavy fuel (Mazot). In 1999, the owner ceased operation of the furnaces, removed the two rotary furnaces, and confined site activities to refining lead ingots

in two refining kettles and extruding the refined lead into lead pipes. Since that time natural gas has been used for firing the kettles.

The smelting process adopted in the smelter lacked environmental controls. The furnaces and kettles had non-standard designs, which resulted in high emissions of fugitive dust during charging and operation. The furnaces were fitted with inadequate filters, and virtually no other proper pollution controls were installed.

Exhibit 2.2: Location of El Mahy Smelter with respect to Neighboring Activities

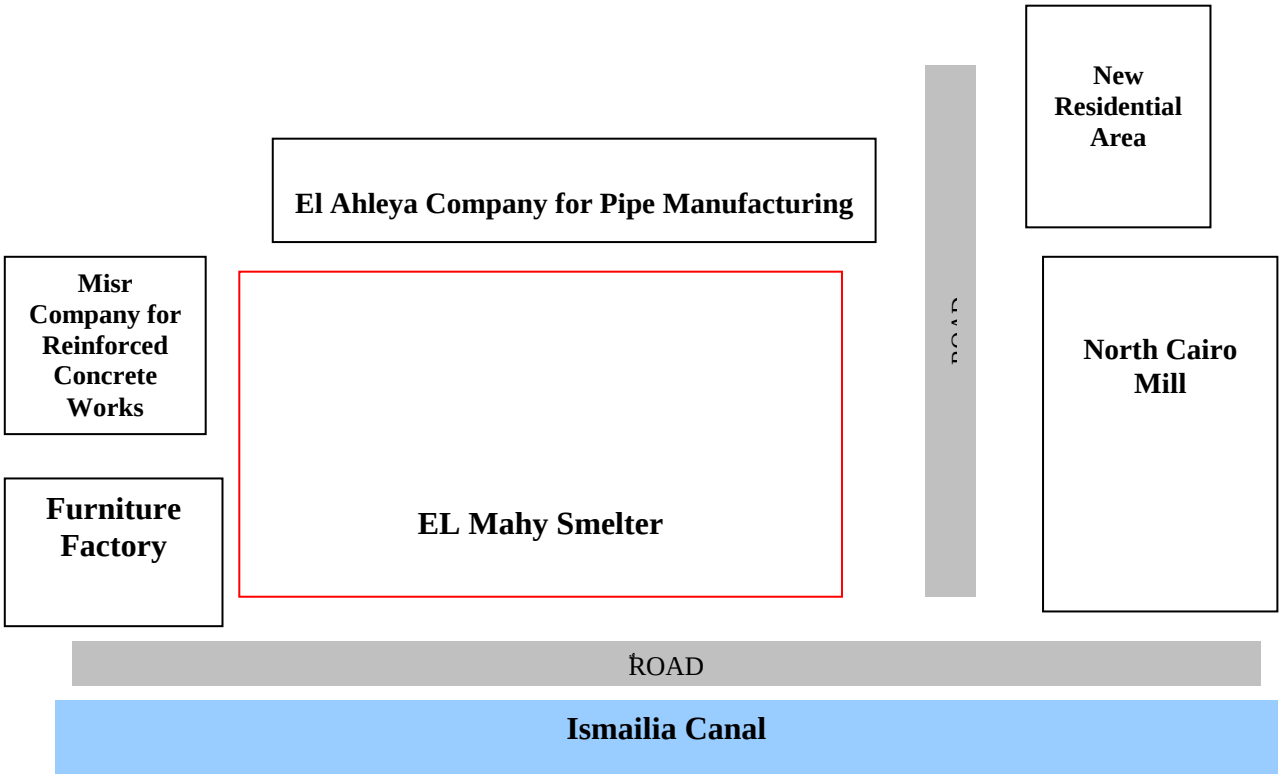
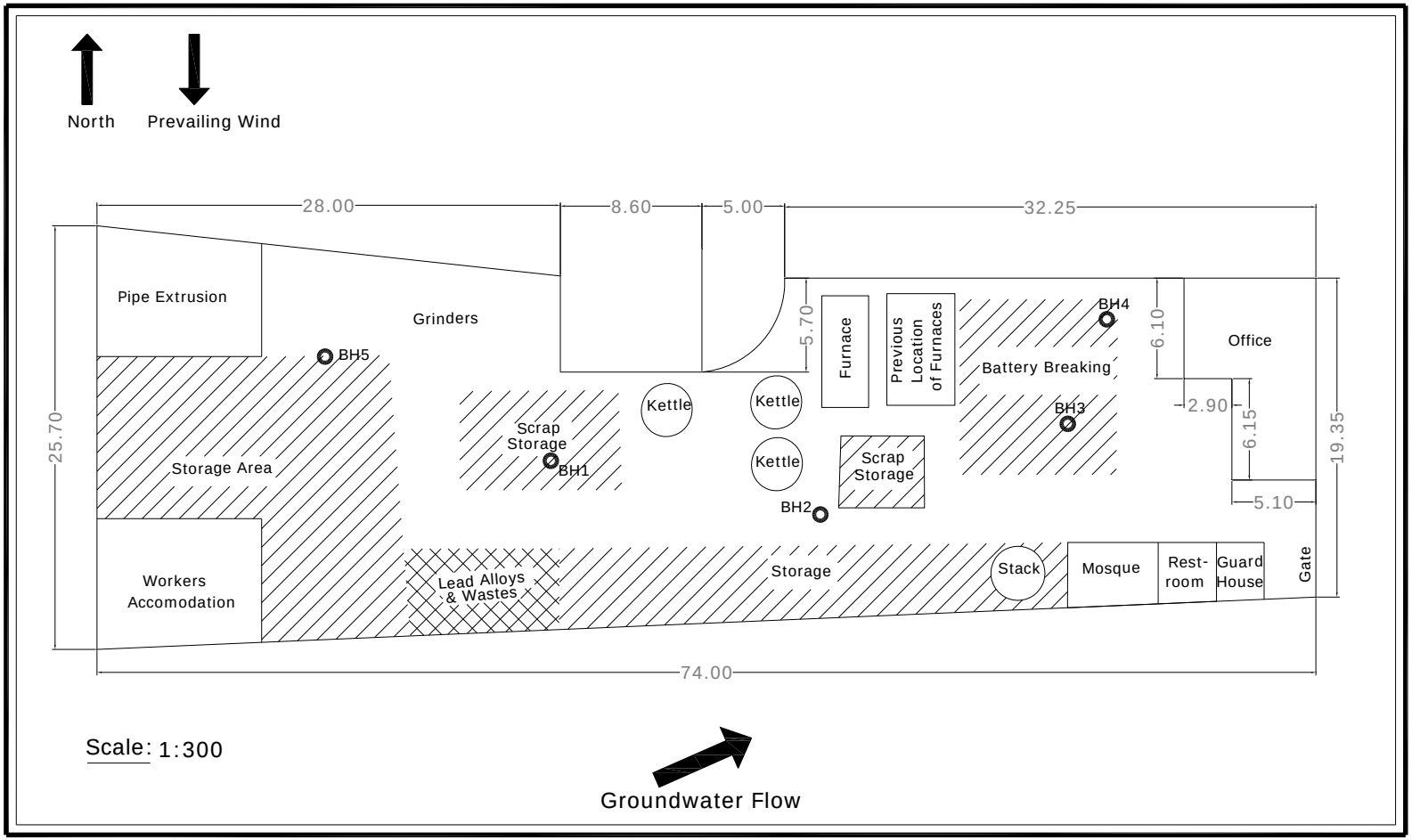


Exhibit 2.3

Site Plan for EL Mahy Smelter



2.3 Proposed Remediation Activities

Site Characterization Studies were conducted by LIFE-Lead at El Mahy Smelter during the winter of 2004-2005. The site characterizations indicated that lead contamination levels in the smelters exceeded the recommended clean-up levels developed by LIFE-Lead and the EEAA in exposed structures such as walls and windows (Life-Lead Site Characterization Study, 2005). Findings of this study are summarized in Chapter 4.

Based on the collected baseline information; site characterization; laws and regulations; future use of the site; and within a national and international policy context (i.e., Law 4/1994 and USAID requirements); a long list of remediation alternatives was proposed to remediate the project sites (Appendix A).

The proposed long list of remediation alternatives, developed for different contaminated media, were subjected to further analysis to identify a short list of remediation techniques that could remediate the site to the required standards and reduce risks to human health and the environment. The USEPA Evaluation Criteria (USEPA, 1994) were used as a base for this remediation method selection process. These criteria are in compliance with applicable or relevant and appropriate requirements, long-term effectiveness and performance; reduction of toxicity; mobility or volume; short-term effectiveness; implementability, and cost.

2.3.1 Construction Activities

Four remediation alternatives were developed for the El Mahy site. Alternative 3 is the recommended alternative and consists of the following major activities:

- Main Activities
  - Construction of the workers decontamination station. It consists of a clean room, a shower area, a dirty room, and water collection and filtration system.
  - Assembly of a truck decontamination. The station consists of a layer of compacted crashed limestone, topped with a 600 gm/m ^{2} geo-textile material, and covered with High Density Poly-Ethylene (HDPE) sheet of 1.5 mm thickness. High pressure washing machine will be used to decontaminate the trucks.
  - Used waster from decontamination station and truck decontamination area is collected in a sedimentation tank to be filtered before disposal to the municipal sewer system or at Alexandria Hazardous waste Landfill depending on its properties.

- Smelter Decontamination and Painting
  - Decontamination of Administration and Workers Buildings using HEPA vacuum and high-pressure water machines with TSP detergent.
  - Decontamination of steel structures using High Efficient Particulate Air (HEPA) vacuum followed by high-pressure water machines with TSP detergent.
  - Wall encapsulation with padded plaster paint (tartasha mamsousa) and painting of interior administrative and workers buildings.
  - Furniture decontamination using wet mops.
  - Dismantling and decontamination of equipment and handover to the Owner. These include the three kettles, vibratory furnace, grinding, machine and pipe extrusion equipment.
  - Loading and transfer of decontaminated waste to Abu Zaabal Landfill for disposal.

- Demolition
  - Demolition of the decontaminated walls and interior buildings along the south wall. This will be done according to the "ACT Safe Demolition Work Code of Practice". The decontaminated debris will be transported to Abu Zaabal Landfill.
  - Stack demolition in accordance with the "ACT Safe Demolition Work Code of Practice". Loading and hauling stack debris to the Alexandria Hazardous Waste Landfill for disposal.

- Soil Excavation
  - Contaminated soil excavation and transfer to the Alexandria Hazardous Waste Landfill for disposal. Excavation depths shall be determined in the field using an XRF.
  - Backfilling and compaction of the excavated areas with clean fill material.
  - Construction of fence footing.
  - Placement of impermeable concrete hard cap inside the facility with steel structure foundation.
  - Haul of excavated soil with lead concentration higher than the clean-up level of 1500 µg/g to the Alexandria Hazardous Waste Landfill.

The remediation activities at the El Mahy site will commence in January 2006 and will require approximately 12 weeks to complete.

2.3.2 Operation and Maintenance

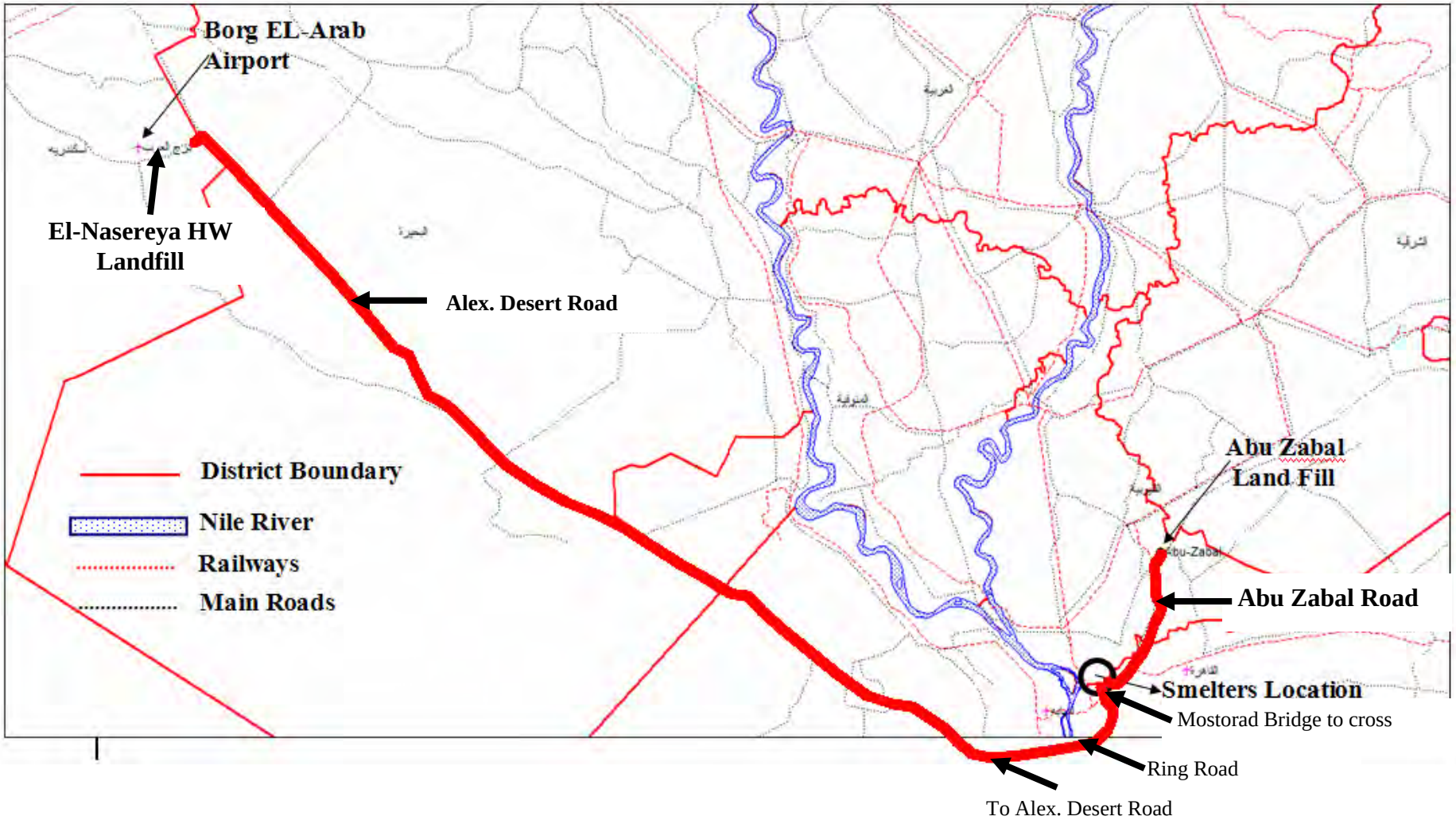
The proposed remediation action posses good effectiveness. Contaminated soil is treated on site to meet non-hazardous leaching characteristics, part of the soil will be used for backfill and the rest removed from the site and disposed in a non-regulated land disposal facility. Onsite exposure to residual contamination is limited by encapsulation of structure surfaces and isolation of residual contamination remaining in soil. The concrete cap typically requires some level of long-term monitoring, including institutional controls.

2.4 Waste Transportation Routes

Contractors will be responsible for transportation of waste generated from the remediation actions. The non-hazardous waste generated from clean-up activities will be disposed in Abu Zaabal Landfill. The waste will travel from Shoubra El Kheima to Abu Zaabal along the Ismailia Canal Road for approximately 25 km. The route passes through agricultural land and next to industrial sites and the Abu Zaabal Prison near the landfill (Exhibit 2.4).

The hazardous waste will be disposed in the Nasereya Hazardous Waste Landfill, Alexandria. The waste will travel from Shoubra El Kheima to Nasereya along the Ring Road and then the Alexandria Desert Road for approximately 250 km**.** The route crosses the Nile River and passes through agricultural land in route to the landfill (Exhibit 2.4).

Exhibit 2.4: Transportation Routes to Waste Disposal Sites; El Nasereya and Abu Zaabal



3. BASELINE ENVIRONMENTAL CONDITIONS

3.1 Physical Environment

3.1.1 Climate

According to meteorological records, Table 3.1 and data from the Climatic Atlas of Egypt, EMA, (1996), the climatic features of the project area are characterized by the following:

- The annual mean air temperature is approximately 19.9 °C and the average monthly temperature reaches its maximum value in July and August (26.9 °C) and its minimum value in January (11.2 °C).

- The average annual relative humidity is approximately 68 percent, and the average monthly relative humidity reaches its maximum value in December (81 percent) and its minimum value in May (53 percent).

- Rainfall is very limited. The average annual rainfall is about 25.5 mm. The majority of the rainfall is limited to three months (December through February), with the highest in December. Annual rain days are very few and storms occur occasionally and are usually of short duration.

- The dominant winds over the year have a northern component with an annual mean velocity of 12.27 km/h. The dominant winds over the winter season trend SSW, S, and SW. The affecting dominant winds over the summer period are multidirectional and trend NNW, N, and NNE. In transitional periods (spring and autumn), the winds trend dominantly in N and NNE directions.

The wind roses, Exhibit 3.1, represent the percentage ratio of the frequencies of occurrence of wind (the length of the column) blowing from certain direction. The different parts (with different colors and widths) of the column represent the wind speed range in knots. The number in the circle represents the percentage ratio of calm wind frequency multiplied by 10. Table 3.2 gives the distribution of wind direction throughout the year.

Table 3.1: Meteorological Records

Climatic Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Average
Mean Daily Temperature (°C)	11.2	12.5	15.4	19.2	23.3	26	26.9	26.7	24.3	22	18	12.3	19.9
Mean Daily Relative Humidity (%)	79	72	67	60	53	56	62	68	72	73	78	81	68
Average Wind Speed (km/h)	7.6	8.6	9.8	9.9	10.5	10.5	9.7	9.6	9.4	8.2	7.4	6.8	9
Prevailing Wind Direction	SSW	SSW	NE	NE	NE	NNE NW	NW	NNW	N	NE	NE	SW	
Monthly Rainfall (mm)	4.5	4	3.5	2	1.5	0	0	0	0	2.5	2.5	5	Total:25.5

Source: Egyptian Meteorological Authority, 1996

Exhibit 3.1: Mean Monthly Wind Roses Recorded at the Cairo Station
(Egyptian Meteorological Authority, 1996)

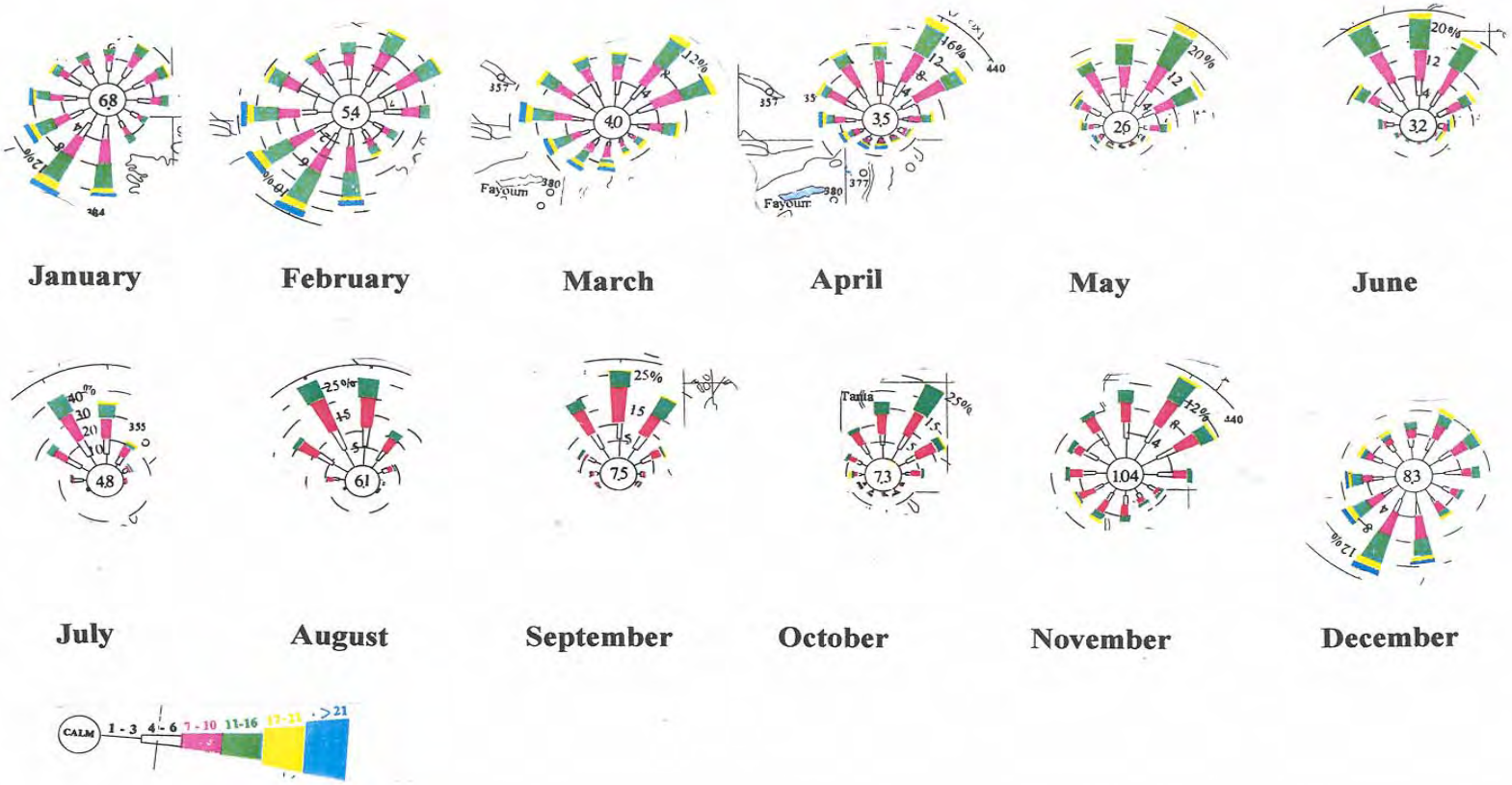


Table 3.2: Distribution of Wind Direction throughout the Year

Wind Direction	Velocity (Km/hr)	Percentage
Calm Wind	0	4.04
North	9.76	13.79
North-east	13.82	50.7
East	11.78	1.3
South-east	5.87	0.87
South	8.79	4.02
South west	12.8	7.82
West	14.52	5.26
North-west	13.05	12.2
Average Wind Velocity	**12.27**	

3.1.2 Air Quality and Noise

Air Quality

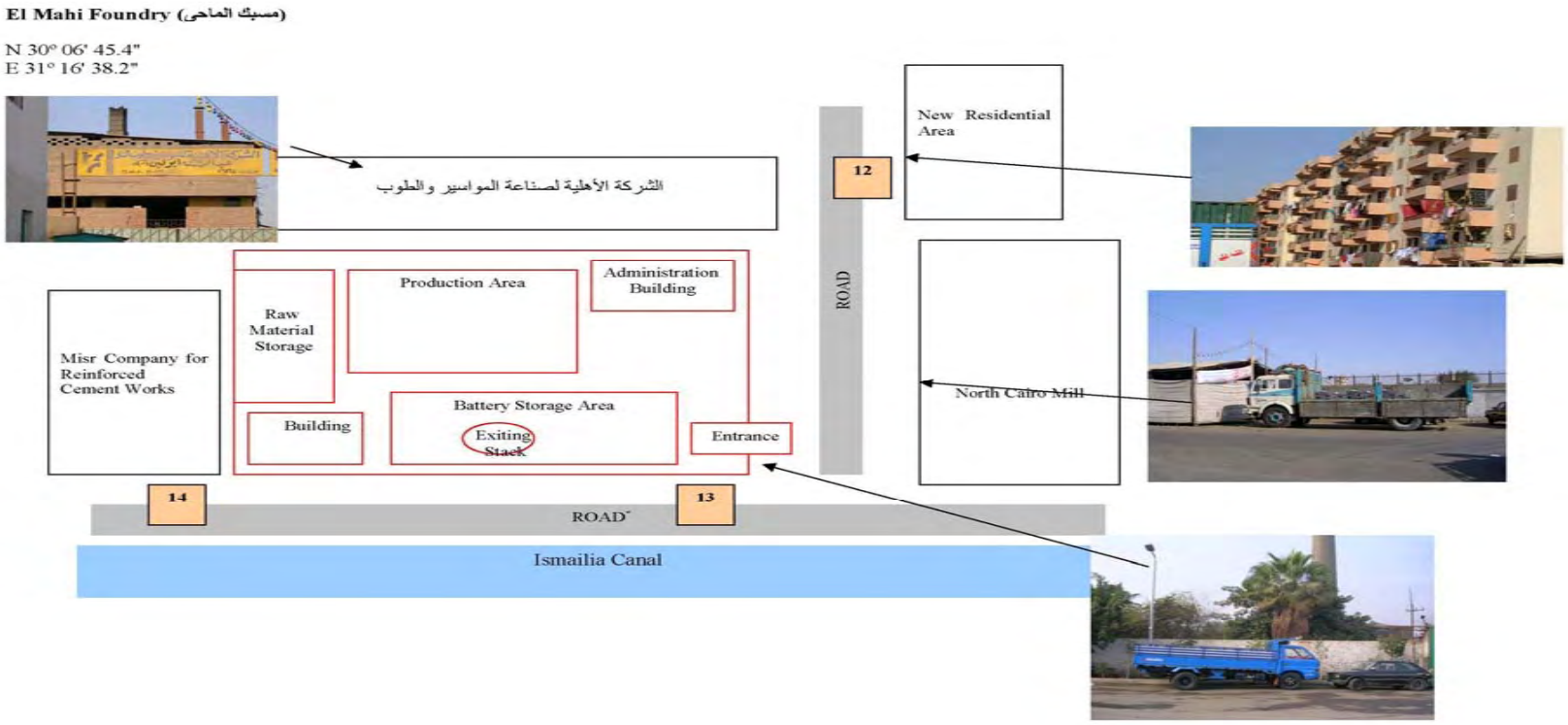
During the period October 1998 to July 1999, high particulate matter (PM) 10, PM 2.5, and lead were detected (CAIP, 2002). Particulate matter and lead were monitored in 36 sites in Greater Cairo. The results showed that, in the industrial area of Shoubra El Kheima, the highest mean inhalable PM was found to be 313 $\mu g/m^3$ exceeding the allowable limit of Law 4/1994 (70 $\mu g/m^3$) by more than 4 folds. Lead concentrations of 26 $\mu g/m^3$ were recorded which also exceeded Law 4 annual average of 1.0 $\mu g/m^3$.

In 2004, air quality in the Shoubra El Kheima industrial area was improved, where the mean PM 10 levels dropped to 178 $\mu g/m^3$. Also, lead levels dropped to 1.02 $\mu g/m^3$ which nearly meets Law 4 annual average of 1.0 $\mu g/m^3$ (EEPP, 2004).

Noise

A noise survey was carried out at the project area to acquire baseline data. The level of noise was measured around El Mahy smelter (Exhibit 3.2).

Exhibit 3.2: Noise Monitoring Locations around El Mahy Smelter



Measurements were taken during the day, evening, and night as per the requirements of Law 4/1994. Each reading was repeated 3 times to reflect different local conditions (e.g., no traffic, and heavy traffic). The results of the survey are presented in Table 3.3. The following can be concluded:

- Noise readings were generally within the legal limits during periods of low and light traffic throughout the day.
- During periods of heavy traffic, the noise levels exceeded the limits, regardless of the time of the day.
- Noise readings taken during the daytime and evening were higher than night readings due to the presence of traffic.
- Noise levels detected at the existing noise sources (factories and workshops) were found to be higher than those detected at the existing receptors (residential areas).
- Noise readings were highest along the Ismailia Canal Road.

Table 3.3: Results of Baseline Noise Monitoring Survey around EL Mahy Smelter

Location		Measured Noise Level, dB(A) and Noise Limit		
		Day time 7 am – 6 pm	Evening 6 pm – 10 pm	Night 10 pm – 7 am
12	At residential Area North of the El Mahy Smelter	50, 60, 66	53, 56, 58	46, 50, 52
13	On Ismailia Canal Road South of the EL Mahy Smelter	52, 59, 70	53, 55, 57	48, 50, 53
14	Ismailia Canal Road in front of Misr Company for Concrete Works	53, 57, 71	51, 55, 60	45, 48, 56
Law Limit for Dwelling Zone Including Workshops or Public Road		**50-60**	**45-55**	**40-50**

3.1.3 Topography, Geology, and Hydrogeology Characteristics

The site where the project is located is within the flood plain of the Nile River. The topography of the area is almost flat with an average altitude of 17 m above mean sea level. The area, in general, is a part of the Northern tip of the Nile Delta and alluvial plain, which consists of silty and sandy clay deposits (Holocene-Q3) that overlay the graded sand and gravel Pleistocene aquifer (Pleistocene-Q1). The main aquifer belongs to the Quaternary formation that is a Nile River recharged formation. The Holocene (Q3) layer is about 15 m thick and the thickness of the Pleistocene (Q1) is not definitely known but extends beyond 200 m deep. The layers forming the aquifer can be classified into the following (Exhibit 3.3):

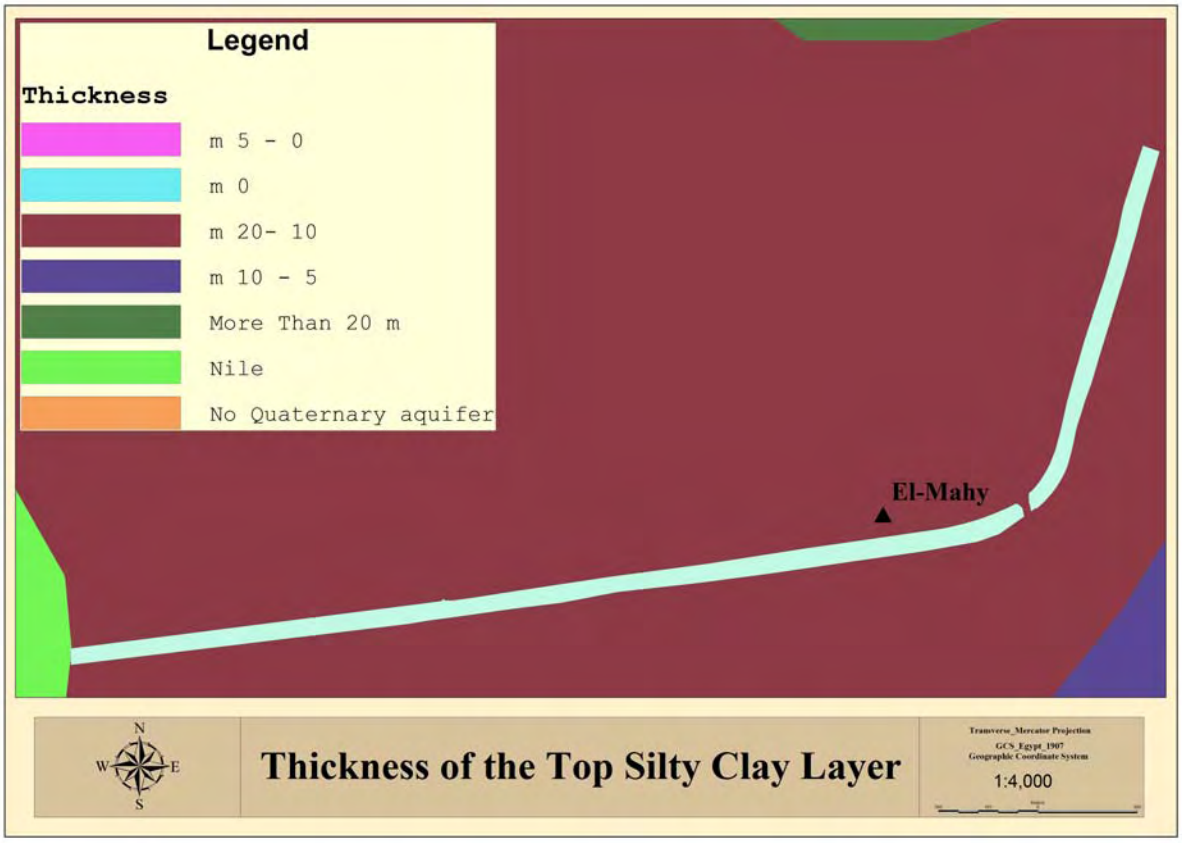
- A clay cap that is the surface layer over the aquifer, formed from clay precipitants that belong to the Holocene Era. The thickness of this layer ranges from 2 to 10 m. This semi-permeable layer allows for water penetration to the aquifer. The vertical permeability of this layer depends on several conditions including the following:

  - The permeability factor to the vertical direction.
  - The thickness of the surface layer.
  - The layer sequence.
  - Piezometric pressure difference between the groundwater and the free water surface level in the clay layer.

- Sand and gravel layers of the aquifer follow the surface layer. The thickness of this layer ranges from 100 to 130 m. Previous studies indicated that the average hydraulic conductivity is 30 m/day and the average transmissivity is 1,000 m^2/day.

- The lower clay layer, where it exists, below the aquifer consists of very rigid clay and is considered to be very impermeable.

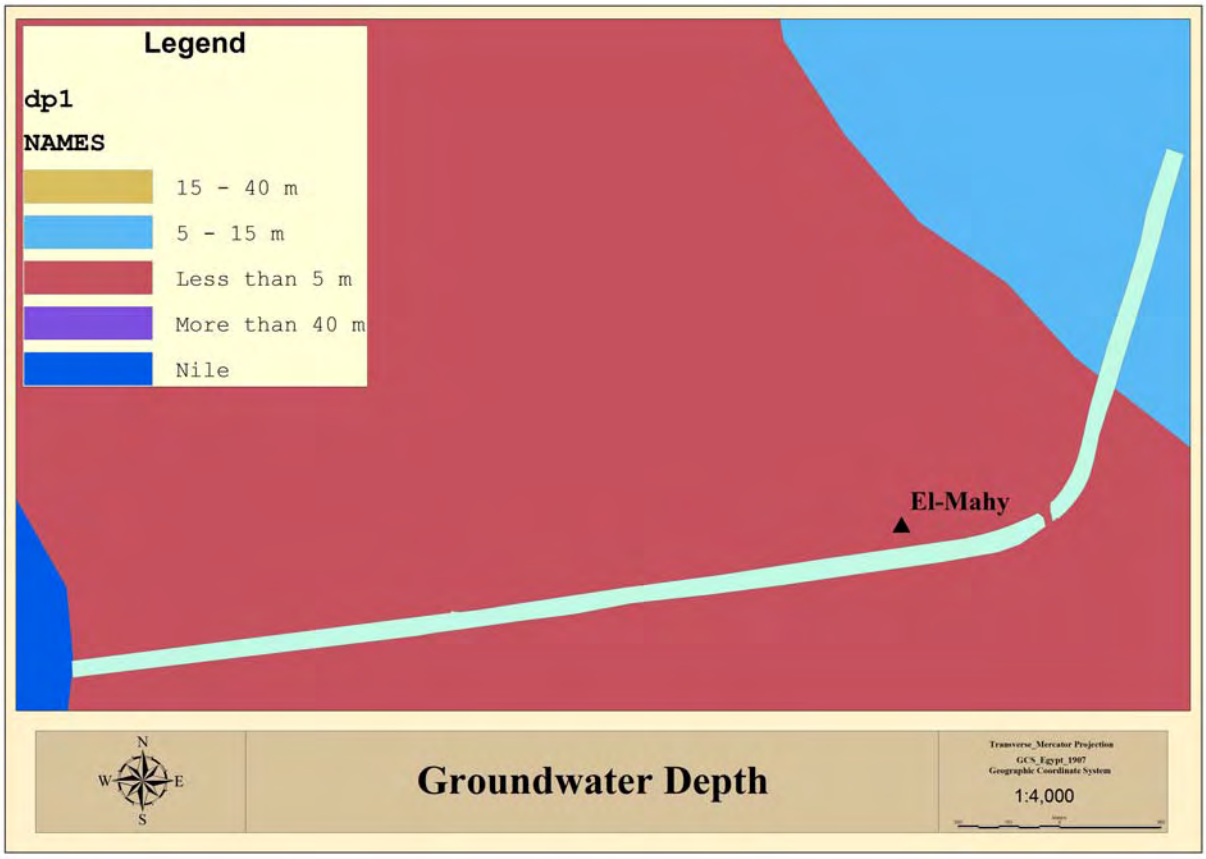
Exhibit 3.3: Thickness of the Silty Clay Layer underneath El Mahy Smelters



The main groundwater flow is from the south to the north and from west to east. There are some secondary movements due to some depletion in the groundwater level due to excessive pumping. The main sources of groundwater recharge in the Study Area are the Nile River and the Ismailia Canal. Seepage from the sewage system and drainage networks are the secondary recharge sources. The groundwater discharge is mainly from the groundwater wells.

Underlying the smelters and the school there are two hydrogeologic units, an upper silt and clay layer, and a major alluvial aquifer. The groundwater depth is between 5 and 6 m below the ground surface (Exhibit 3.4). Two hundred meters to the south of the site is the Ismailia Canal, which is a source of recharge to the aquifer.

Exhibit 3.4: Groundwater Depth underneath El Mahy Smelter



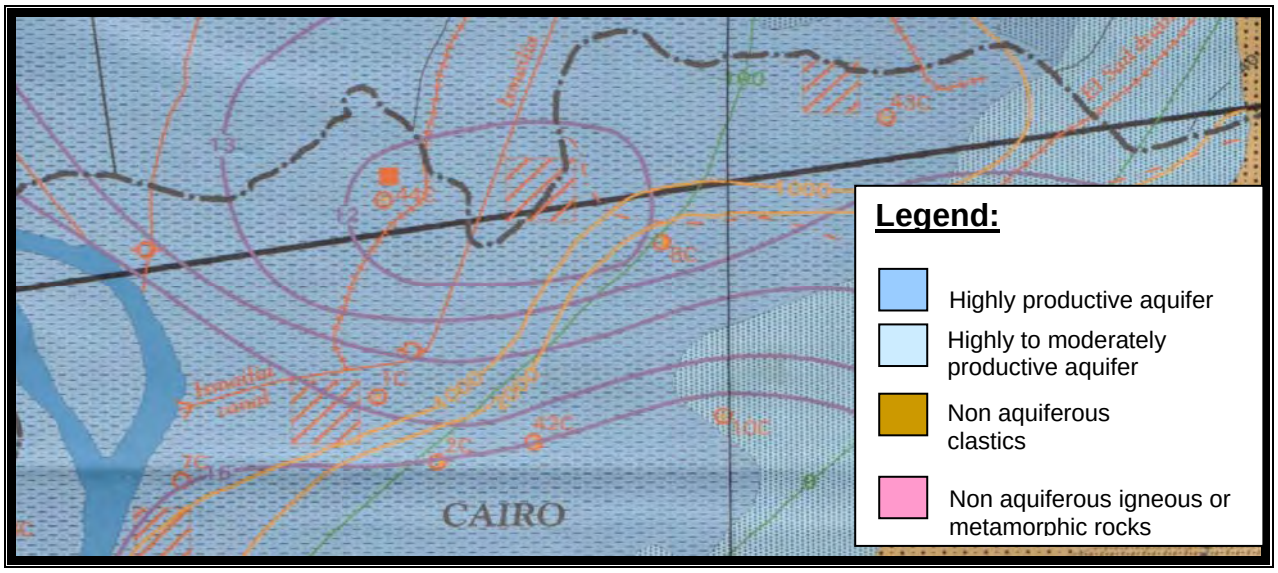
3.1.4 Water Supply and Quality

Groundwater Supply

Shoubra El Kheima--

Generally, the aquifer in Shoubra El Kheima is highly productive. The aquifer is continuously recharged from the Ismailia Canal and from the Nile River, the contribution of rainfall to the recharge of aquifer is minor. The groundwater is highly abstracted in this area. Exhibit 3.5 shows the hydrological map of Shoubra El Kheima. The industrial water wells are used only for industrial purposes and not a potable water source. Potable water is provided to all residents and industries by the GOQ.

Exhibit 3.5: The Hydrological Map of Shoubra El Kheima

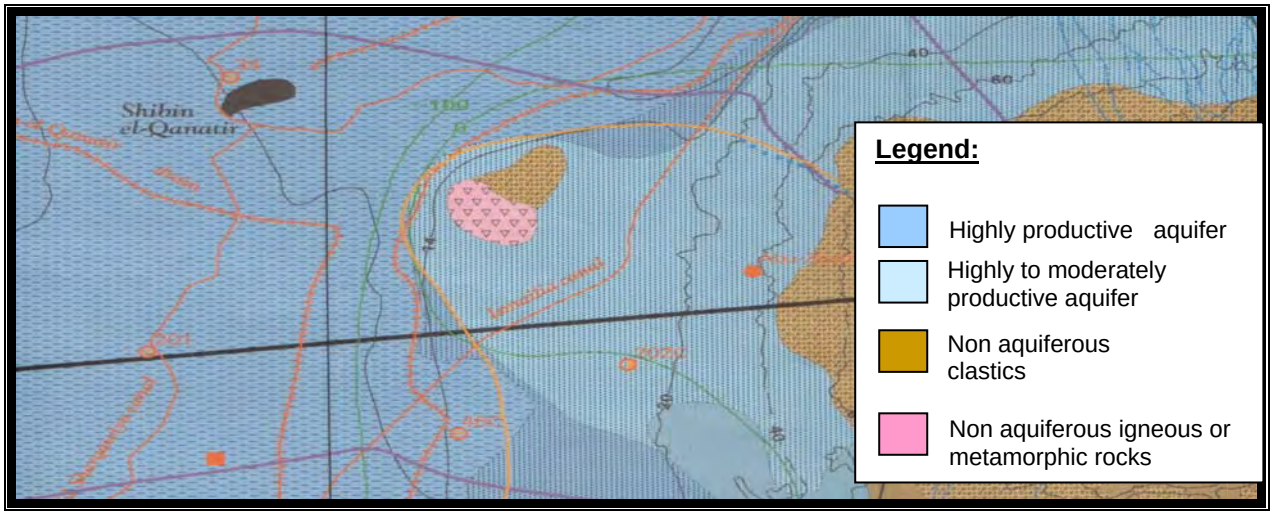


Abu Zaabal--

The aquifer in the Abu Zaabal area is highly to moderately productive consisting of quaternary graded sand and intercalated by clay lenses. The aquifer is occasionally recharged from rainfall, surface runoff, and/or irrigation water.

At the landfill, the area is formed of non-aquiferous ingeous or metamorphic rocks and non aquiferous clastics consisting of tertiary clay and shale. Local groundwater occurs in fissured and weathered zones. The main lithology in the area of the landfill is either coarse sands and gravel with limestone interbeded (Miocene "Tm") or basalt (Oligocene "To"). Exhibit 3.6 shows the hydrological map of Abu Zaabal.

Exhibit 3.6: The Hydrological Map of Abu Zaabal



Surface Water Supply

The nearest surface water to the project site is the Ismailia Canal which is located within 100 meters of the smelters. The Ismailia Canal is a source of recharge to the aquifer as well as a source of drinking water.

Groundwater Quality

A water and sediment sampling program was carried out in Shoubra El Kheima and Abu Zaabal. The main objective was to evaluate current baseline groundwater and surface water conditions, primarily water quality and heavy metal contamination, in the vicinity of the proposed sites to be remediated and around the Abu Zaabal Landfill. Groundwater samples were collected according to the USEPA low-flow groundwater sampling procedures (EPA/540/S-95/504). The sampling program was performed under the supervision of the Quality Assurance Manager of Life-Lead. Samples collected were as follows:

- Eight samples were collected from six wells in the Abu Zaabal area, six samples in addition to a duplicate and a cross reference.
- Three surface water samples were collected from two locations in the Ismailia Canal, two samples in addition to a cross reference.
- Four sediment samples were collected from three locations in the Ismailia Canal, three samples in addition to a duplicate.
- Twenty five samples were collected from twenty one wells in the Shoubra El Kheima area, twenty one samples in addition to two duplicates and two cross-references.
- Additionally, three spikes were sent to the laboratories for quality assurance. Two spikes sent to Ain Shams University-Reference Laboratory (ASU-RL) and one spike to Egyptian Mineral Resources Authority (EMRA) Laboratory.

Forty-three samples were sent to the laboratory for analysis, 39 water samples and 4 sediment samples. Locations of water samples are provided in Appendix B, Exhibit 1.

Water Quality Analysis Results--

On-site water quality analyses were performed during sample collection for all groundwater and surface water samples. The water quality data for the collected surface and groundwater samples are shown in Appendix B, Table 1.

Groundwater Samples at Shoubra El Kheima--

Twenty wells representing the vicinity of the six sites were selected. Additionally, a well was selected about one kilometer upstream, in terms of groundwater flow, to the above-mentioned sites representing a blank sample. Of the 21 wells, 19 wells were productive and equipped with water pumping installations. Water was pumped for an identified period of time prior to sample collection to ensure that samples represent the aquifer. The other two were monitoring wells installed during the CAIP. Appendix B, Table 2 provides groundwater sample analysis results at Shoubra El Kheima.

Groundwater Samples at Abu Zaabal--

Six wells were identified and sampled at the Abu Zaabal disposal site and the surrounding area. Appendix B, Table 3 provides groundwater sample analysis results at Abu Zaabal disposal site.

Surface Water Samples from the Ismailia Canal--

Two locations were identified for surface water sample collection. The first location was about 200 meters upstream the Awadallah No. 2 Smelter, and the second location was 200 meters downstream of the El Mahy Smelter. Appendix B, Table 4 provides surface water sample analysis results.

Sediment Samples from the Ismailia Canal--

Three locations were identified for sediment sample collection. The first location was about 200 meters upstream of the Awadallah No. 2 Smelter, the second location was in front of the School and the Awadallah No. 1 Smelter, and the third location was 200 meters downstream of the El Mahy Smelter. Appendix B, Table 5 provides sediment samples analysis results.

Water Sampling and Analysis Findings

The following provides a summary of the groundwater sampling from Shoubra El Kheima:

- pH and nitrate concentrations in all samples were within the permissible limits set in Law 48 and its executive regulations.
- Ammonia concentration in all samples was above the legal limits.
- Lead concentrations in all samples collected were below the legal limits, with the exception of the sample collected from the willow monitoring well (6m) at the Ismailia Canal reading a higher concentration (0.2089 mg/l) compared to the legal limits (0.05 mg/l)

The following provides a summary of the groundwater sampling conducted at Abu Zaabal:

- TDS concentrations in samples collected from the disposal site (sample AZ101) and the neighbouring settlement (samples 201 and 202) were very high (4,078 and 6,336 mg/l respectively). These wells were drilled in rocky areas, limestone in the disposal site, and basalt in the neighbouring settlement.
- pH, alkalinity, and nitrate concentrations in all samples were within the permissible limits set in Law 48 and its executive regulations.
- Ammonia concentration in all samples was above the legal limits.
- Lead concentrations in all samples were far below the legal limits.

The following provides a summary of the surface water sampling from the Ismailia Canal:

- pH, TDS, and nitrate concentrations in all samples were within the permissible limits set in Law 48 and its executive regulations.
- Ammonia concentration in all samples was above the legal limits.
- Increased alkalinity concentration in the downstream sample.
- Lead concentrations in all samples were far below the legal limits.

Lead concentrations in the sediment samples from the Ismailia Canal were very low and no legal limits are set for soil contamination.

3.2 Biological Environment

3.2.1 Terrestrial Ecology

The project site is located within the urban landscape matrix of Greater Cairo, parallel to the Ismailia Canal. In general, there are no significant habitats within the project area of influence. Vegetation, an important ecological indicator, is found far from this area. The only and most important ecological feature is the Ismailia Canal that runs as a corridor to the south of the project site. The Ismailia Canal bank on the project site is used as a plant nursery with many different species of plants. Some plant species grow along the bank slope.

The project area, which can be considered as a man made environment, appears to have little ecological significance and low biodiversity due to the immense alteration of the natural ecology. In these areas, only plants and animals that tolerate urban pressures and that can live close to man are found (EEAA, 1993). None of these appear to be of conservational or ecological importance.

3.2.2 Aquatic Ecology

The following fish species are recorded in the Ismailia Canal around the project site: Oreochromis spp, Tilapia zillii, Anguilla anguilla, Clarias gariepinus, Heterobranchus spp, Lates niloticus, and Synodontis clarias. In the vicinity of the project site, only recreational fishing is practiced. Interviews with the local community indicated that the catch is generally low and that no commercial fishing takes place near the site.

3.3 Socio-economic Conditions

The El Mahy Smelter is located in Hai East in the area of Shoubra El Kheima. It is located in a mixed industrial and residential area.

3.3.1 Demography

The population in Hai Shark (East District) of Shoubra El Kheima increased from 454,000 in 1996 to 536,900 in 2001 with an annual population growth rate of 3.7 percent. This annual growth rate is higher than in the city, governorate, or in Egypt as a whole.

The population of concern is 182,096 residents in the immediate Study Area, which is defined as a circle with a radius of one kilometer around the Awadallah Smelter No. 1. The

population inhabiting this area is distributed among four administrative subdistricts: Mostorod, Bahteem, Masaken El Amiria, and El Zawya El Hamra. Approximately 20 percent of the population in Mostorod, Bahteem, and El Zawya El Hamra and 80 percent of the population in Masaken El Amiria is located within the Study Area. Table 3.4 presents population estimates for the Study Area including estimates for some of the sub-populations that are at highest risk from lead contamination.

Table 3.4: Estimated Population in the Study Area by Age and Sex

	Mostorod	Bahteem	Masaken El Amiria	El Zawya El Hamra	Total
Total Population	17,946	72,845	40,097	51,208	182,096
Children up to 7 years of age	4,845	19,668	10,826	13,826	49,165
Females of reproductive age (15 – 49 years)	4,487	18,211	10,024	12,802	45,524

3.3.2 Economic Activities and Employment

The major economic activities in Hai Shark are industry and services (UNDP HDR, 2003). Nearly 45 percent of the labor force in the Hai Shark is in the industrial sector, 43 percent in the services sector, and 12 percent in the agricultural sector. One third of the total labor force and one half of the women in the labor force work for the government or in the public sector (which cuts across the other three sectors). The labor force comprised 25.2 percent of the total population in the Hai Shark in 2001. Men comprise 88.7 percent of the labor force, and most people in the labor force are wage earners (78.8 percent).

Overall unemployment in the Hai Shark is relatively low (5.6 percent of the labor force), but is twice as high for women (12 percent) and adults from ages 15 to 29 (11.2 percent). However, all of these unemployment rates are lower than the rates for the city of Shoubra El Kheima, the Governorate of Qalyoubia, and Egypt as a whole.

3.3.3 Quality of Life Indices

Life Expectancy and Mortality Rates

According to official data, life expectancy at birth for Hai Shark in 2001 is 68.0 years. Such average shows to be slightly higher than Shoubra El Kheima (67.6 yr) and total of Egypt (67.1 yr), but is still lower than total Governorate (68.5 yr). Infant mortality and maternal mortality rates for Hai Shark are 12.7 per 1,000 and 22.0 per 100,000, respectively). Infant mortality and maternal mortality rates for Shoubra El Kheima are 12.7 per 1,000 and 23.0 per 100,000, respectively, and are significantly lower than the total Governorate exhibits of 17.7 per 1,000 and 30.3 per 100,000, respectively.

Infant mortality measures suffer from under-registration. Therefore, the registered and adjusted infant and under 5 mortality rates are calculated. Registered infant mortality rates in Hai Shark reached 12.3 per 1,000 births in 2001; this was adjusted to 12.7 in 2000. While

registered under 5 mortality rates reached 19.5 per 1,000 births in 2001 and were adjusted to 20.0 in 2000.

Maternal Care and Child Survival

As registered in 2001, more than half of pregnant women in Hai Shark and Shoubra El Kheima City get prenatal care (52.4 and 52.9 percent, respectively). Births in Hai Shark and Shoubra El Kheima were under the supervision of health personnel 56.3 and 56.9 percent of the time, respectively. Records indicate that approximately 87.1 and 87.9 percent of children born were breastfed in Hai Shark and Shoubra Al Kheima City. Such rates are lower than the total of the Governorate and Egypt. In contrast, data indicates that only 2.7 and 2.9 percent of children under 5 in Hai Shark and Shoubra Al Kheima City are underweight compared to 3.6 and 8.8 percent in total of the Governorate and Egypt.

3.3.4 Transportation and Support Services

Data on the road infrastructure is only available from Shoubra El Kheima City. Available information illustrates that a total of 121 km of paved roads cover 12 km of highways, 17 km of main roads, 28km of regional roads, and 64 km of internal roads. Per capita of paved roads is estimated at 7,605 people/km. Unpaved roads cover a total of 178km (IDSC, 1998).

In the area of Shoubra El Kheima, there is only one water plant. While total water production rates reach 200,000 m^3/day, the total consumed amount is approximately 190,000 m^3/day. Domestic water consumption per capita is estimated to be 190.18 liters/day (IDSC, 1998).

With respect to sanitation, there are seven sanitation plants in the area of Shoubra El Kheima. Total capacity of these plants is estimated at 350 thousands m^3/day, with a total per capita of 380 liters/day (IDSC, 1998). In 2001, households with access to sanitation reached 98.7 percent of the total population (EHDR, 2003).

3.3.5 Education, Health, and Social Services

Literacy and Education Levels

Total and female literacy rates (15+) in Hai Shark reached 72.6 and 62.8 percent, respectively. In Shoubra El Kheima City, the total and female literacy rates are 75.7 and 66.6 percent, respectively, and are relatively higher than total Governorate and total of Egypt in 2001. However, gross enrollment ratios in primary, preparatory, and secondary schools in Hai Shark remain lower than the average in the City, Governorate, and Egypt in 2000/2001. More than 23 percent of the Hai Shark population has secondary or higher education that is similar to the total in Egypt.

School Enrollment

Official data for Hai Shark in 2000/2001 shows that gross enrollment ratio in 1st, 2nd, and 3rd level is 33.2 percent. The basic and secondary enrollment ratio is 72.6 percent for a all students and 68.8 percent for females. With the absence of Azhar Schools in Hai Shark, 91.9 percent of the total pupils go to governmental schools and only 8.1 percent go to private schools. Secondary technical enrollment represents 74.1 percent of the total secondary enrollment (EHDR, 2003).

Education Imbalances

According to the official data for Hai Shark in 2000/2001, class density is 39.9 pupils in primary schools with a rate of 21.6 pupils per teacher. Imbalances in preparatory schools are much higher as class density reaches 56.1 pupils with a total of 33.1 pupils per teacher. A total of 7.3 percent of all school buildings are completely unfit and in need of repair (EHDR, 2003).

Education Services

Data on education services in terms of number of schools, institutes, classes, pupils, and teachers is only available on the Shoubra El Kheima City level. There are about 78 public primary and 45 public preparatory schools in Shoubra El Kheima City (IDSC, 1998). These schools include a total of 182,884 pupils enrolled in basic education. In addition, a total of 45,716 pupils are enrolled in secondary schools.

Health Services

Health services in Hai Shark and Shoubra El Kheima City fall within the average of the total for the Governorate. The exception is the number of physicians and nurses per 10,000 people, which shows to be significantly higher in the Governorate and the total for Egypt. The nurse/physician ratio in Hai Shark and Shoubra El Kheima City is 238.8 percent and is significantly lower than the ratio in total for the Governorate which is 287.6 percent. However, the ratio is significantly higher than the ratio for Egypt which was 224.4 percent in 2001.

On the other hand, the Information Decision Support Cabinet (IDSC), Statistical Book of 1998 indicates a wide range of health services in Shoubra El Kheima City. These include different public centers, units, offices, praxes, laboratories, and hospitals affiliated to the Ministry of Health with a total of 69 units. At the same time, 60 of the total are considered day care centers with no facilities for inpatients, while only 4 are equipped for inpatients (IDSC, 1998).

Social Services

There are almost 10 social units in Shoubra El Kheima City, where the ratio of units per 1,000 people reached was 92.02 in 1998. The total number of Non Governmental Organizations (NGOs) reached approximately 127 organizations, where the ratio of organizations per 1,000 people reached was 7.25 in the same year. Activities undertaken by NGOs includes a total of 172 “productive family projects” (i.e., income generation enterprises for poor households), 4 women clubs, 47 nurseries, and 3 children clubs.

Youth centers in the Shoubra El Kheima City are estimated at 12 centers, 10 sport clubs, and one sport committee. The ratio of total youth organizations per 1,000 people reached 40.01 in 1998. These organizations provide various activities in the field of culture, religion, camping, arts, and public works.

Religious Services

The Information Decision Support Cabinet (IDSC) data shows that there were 39 governmental mosques and 183 civil mosques in 1998. These Exhibits indicate active involvement of the civil society in the area. The number of churches in the city was estimated at 7 institutions in 1998 (IDSC, 1998).

4. SITE CHARACTERIZATION

Site Characterization Studies were conducted by LIFE-Lead at the El Mahy Smelter during March 2005. The vertical and horizontal extent of lead contamination at the El Mahy Secondary Lead Smelter site has been delineated to levels sufficient to develop a remedial action plan.

4.1 Results of Site Characterization

Results of the site characterization at the El Mahy Smelter indicated the following:

- The vertical and horizontal extent of lead contamination at the smelter site has been delineated to levels sufficient to develop a remedial action plan.

- Lead levels detected in all of the surface soil samples collected on the smelter property exceeded the proposed site specific RBRG of 1,500 µg/g. Lead concentrations ranged from 61,390 to 151,845 µg/g (from 55 to 138 times greater than the proposed RBRG), with an average of 93,929 µg/g.

- Lead levels detected in the borehole samples exceeded the proposed site specific RBRG of 1,500 µg/g at several depths.

- A hard layer of slag or remnants of refractory from previous land uses was encountered at a depth of 1.0 to 1.5 meters in all boreholes, precluding analysis of soils at greater depths.

- All of the dust wipe samples collected from the interior of the perimeter walls, the insides of buildings, structures, and equipment on the smelter property contained lead levels greater than 500 µg/ft^2.

  - The highest concentrations were recorded on the surface of one of the refining kettles (675,486 µg/ft^2) and samples taken on the interior of the north wall near to the area where lead is ground to produce lead powder (353,226 and 413,301 µg/ft^2).

  - The samples taken from the interior of buildings on the site had lower levels than those taken outside of the buildings, but they were still 6 to 66 times greater than the contamination assessment level.

- All of the surface soil samples collected in the areas surrounding the smelter had lead levels above the proposed RBRG for residential areas of 400 µg/g. Lead levels ranged between 1,315 and 92,955 µg/g (from 3 to 232 times the RBRG).

The BHHRA indicated that the non-carcinogenic HI for workers at the El Mahy Smelter is 96 and the carcinogenic risk to workers at this smelter is 6×10^{-4}. These health risks are due to lead, antimony, arsenic, and cadmium. Blood lead modeling showed that 100 percent of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

Given these results, Life-Lead recommended the following:

- Elevated lead levels and the presence of other heavy metals in the soil on the smelter property should be remediated to a clean-up level less than or equal to 1,500 µg/g.
- Elevated lead dust levels detected on smelter property indicate that the perimeter walls, buildings, structures, and equipment should be remediated to a clean-up level less than or equal to 500 $\mu g/ft^2$.
- Elevated lead levels detected in surface soils adjacent to the site boundary exceeding the residential RBRG for lead of 400 µg/g require further investigation. The scope of the LIFE-Lead project does not include remediation outside the boundaries of the five smelters and the school, so further investigation will have to be done using a mechanism other than the LIFE-Lead project as it is currently structured.

4.2 Future Conditions Without the Project

Ceasing operation of the furnaces at the smelters was a major step in reducing the amount of lead emitted to the environment. However, this has only eliminated a portion of the smelters' impacts on the site and the surrounding community. Because lead does not dissipate, biodegrade, or decay, the lead deposited at the smelter site and in the surrounding community remains a source of lead exposure even after the smelter closure.

Chronic exposure to lead contamination may cause a wide variety of adverse health effects, ranging from reduction in the intelligence quotient of children to kidney cancer. Lead emissions are of particular concern for women of childbearing age and children under seven years of age. Children and young adults in areas that have been contaminated by smelter emissions can be exposed to lead through inhaling or ingesting dust and soil. Fugitive dust from the smelter and the surrounding area can be blown and deposited on uncovered food and water and subsequently ingested.

Without the project, the polluted media (dust and structures) will act as potential sources of lead contamination causing further deterioration of the environmental quality of the area as well as the health quality of the residents and workers of Shoubra El Kheima.

5. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This section of the EIA summarizes national environmental legislation, regulations and guidelines as well as international guidelines, which are directly or indirectly relevant to the project. Firstly, the legislations pertaining to the execution of the EIA will be reviewed. Secondly, the national environmental regulations relevant to the project will be introduced.

5.1 Legislation Pertaining to the EIA

According to the Egyptian Law of the Environment, Law 4/1994 and its Executive Regulations (ERs), an EIA must be submitted with new projects and/or extension of existing facility licensing. Therefore, environmental requirements are integrated into the existing licensing system.

According to the law, the EIA must be submitted to the Competent Administrative Authority (CAA), under which project jurisdiction falls. The CAA should assess the environmental impacts of the project and send the EIA to the EEAA to issue its response within 60 days. If no response is received beyond this period, the study is automatically approved. The proponent is informed of the decision and, in the event of an approval, the requiring conditions for both construction and operation phases. The proponent has the right to issue an appeal within 30 days from the receipt of the decision. The EIA process and roles of key stakeholders are represented by Exhibit 5.1. The CAA for this project is the Governorate of Qalyoubia.

Proposed developments are classified into three categories according to the severity of potential environmental impacts. The three categories include the following:

- Category A**:** projects with minor environmental impacts.
- Category B**:** projects with substantial impacts.
- Category C**:** projects with high potential impacts

The EIA should be prepared according to the Egyptian Guidelines for EIAs (EEAA, 1996), which describe in detail the procedures for the preparation of an EIA.

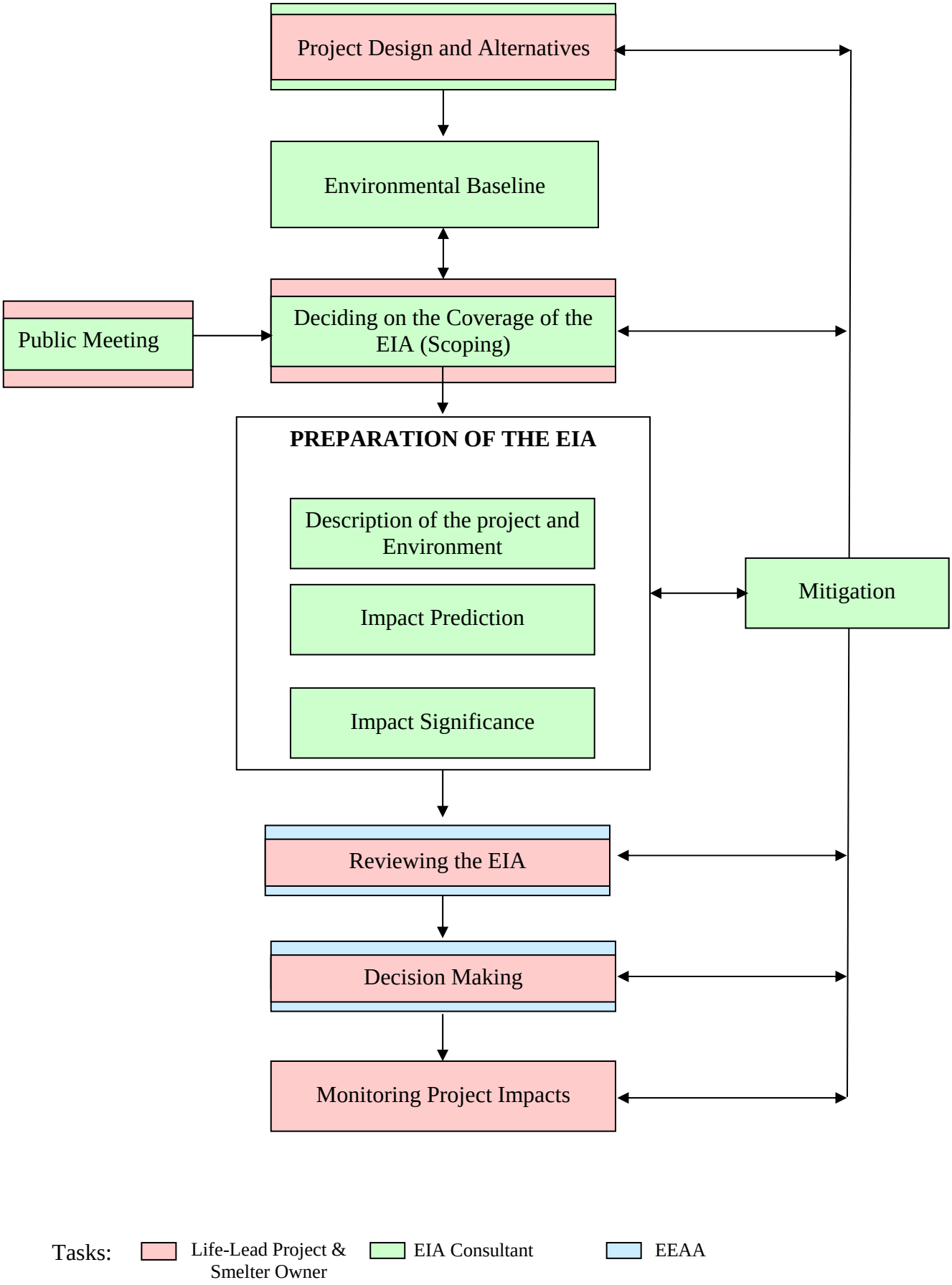
This project is of a special nature since remediation and clean-up activities are not classified under the three EEAA categories. Life-Lead has therefore consulted the EIA Unit of EEAA. Based on the fact that remediation activities involve the handling, transportation, and disposal of contaminated material and the project area includes a number of sensitive receptors such as residential areas, schools, and the Ismailia Canal, this project was classified as Category C. A full environmental impact assessment was requested by EEAA.

5. 2 National Environmental Regulations Pertaining to the Project

5.2.1 Air Quality

With respect to air quality, the Egyptian Law of the Environment (Law 4/1994) regulates the levels of different emissions released to the atmosphere. Article 40 of the Law and Article 42 of its Executive Regulations determine the maximum allowable limits for the concentrations of pollutants resulting from burning of fuels.

Exhibit 5.1: The Environmental Assessment Process and Roles of Key Stakeholders



In addition, Article 36 of Law 4/1994 and Article 37 of its Executive Regulations identify the maximum allowable limits for exhaust gases from machines, engines, and vehicles.

For ambient air pollutants, Article 35 of Law 4/1994 and Article 34 of its Executive Regulations determine the maximum allowable limits for those pollutants, Table 5.1.

Table 5.1: Maximum Limits of Outdoor Air Pollutants
Appendix 5 of the Executive Regulations of Law 4/1994

Pollutant	Maximum Limit	Exposure Period
Sulfur Dioxide (µg/m3)	350 150 60	1 hr 24 hrs 1 year
Carbon Monoxide (mg/m3)	30 10	1hr 8hrs
Nitrogen Dioxide (µg/m3)	400 150	1 hr 24 hrs
Suspended Particles, measured as black smoke (µg/m3)	150 60	24 hrs 1 year
Total Suspended Particles (µg/m3)	230 90	24 hrs 1 year
PM10 (µg/m3)	70	24 hrs
Pb (µg/m3)	1	1 year

5.2.2 Solid Wastes

Similar to air quality, the Egyptian Law of the Environment regulates different activities associated with the management of solid waste. The collection and transportation of solid waste are regulated by Articles 37 of Law 4/1994 and Articles 38 and 39 of the Executive Regulations.

Article 39 of Law 4/1994 and Article 41 of its Executive Regulations set the precautions to be taken during digging, construction, demolition, or transport of resulting waste and dust in order to avoid wafting.

Law 38/1967 is concerned with cleanliness and sanitation. Also, Law 38/1967 Executive Regulations (Decree 134/1968) regulates the collection, transportation, storage, and disposal of solid waste.

5.2.3 Noise

Noise is one of the impacts which is caused by different equipment used for remediating the project site. Therefore, it is important to check the maximum allowable sound level permitted by the Egyptian Law of the Environment, Law 4/1994.

Article 42 of Law 4/1994 and Article 44 of its Executive Regulations determine the maximum allowable limits for sound intensity. Tables 5.2 and 5.3 show the maximum allowable sound levels for different activities and the period of exposure in case of increasing noise level intensity over 90 dB (A), respectively.

Table 5.2: Maximum Allowable Sound Levels for Different Activities

No.	Type of Place/Activity	Maximum Allowable Sound Level (decibel (A))
1.	Work place with up to 8 hour shifts and aiming to limit noise hazards on sense of hearing.	90
2.	Work place where acoustic signals and good audibility are required.	80
3.	Work rooms for the follow up, measurement, and adjustment of high performance operations.	65
4.	Work rooms for computers, typewriters, or similar equipment.	70
5.	Work rooms for activities requiring routine mental concentration.	60

Table 5.3: Period of Exposure in Case of Increasing Noise Level Intensity over 90 dB (A)

Noise Intensity Level dB (A)	95	100	105	110	115
Period of Exposure (hour)	4	2	1	1/2	1/4

5.2.4 Hazardous Substances and Wastes

Hazardous waste (HW) management is addressed by Law 4/1994 for the Environment and its Executive Regulations, stipulating requirements to be implemented in order to ensure the safe handling of this type of waste. HW transportation is primarily addressed by point 3 of Article 28 of the Executive Regulations and is presented below:

- HW Transport Permit (Article 28.3A - ER). HW is to only be transported by transport operators possessing a transport permit. In addition, HW is only to be transported in transport vehicles owned by entities/operators possessing a transport permit.

- Specifications of Transport Vehicles (Article 28.3A.1&2- ER). HW transport vehicles are to be equipped with the necessary safety equipment. The vehicles must be in good working condition and suitable for operation and of adequate capacity and have rotation frequency suitable for the quantities of HW intended for transport.

- Drivers of HW Transport Vehicles (Article 28.3A.3 – ER). Drivers of HW transport vehicles must receive adequate training to be qualified and capable to act in cases of emergency.

- Labeling of HW Transport Vehicles (Article 28.3A.4 - ER). Clear and visible labels must be placed on HW transport vehicles indicating the type of transported waste and the associated hazard as well as the actions to be taken in cases of emergency.

- Routing of HW Transport Vehicles (Article 28.3B and C - ER). HW transport routes are to be determined. Any change in the routing plan requires notification of the Authority for Civil Defense. The concerned competent authority should be notified of the garage address in which the vehicles park as well as the number and date of their licenses. HW transport vehicles are not allowed to pass through residential and other populated areas and city centers during daytime.

- Maintenance and Cleaning of HW Transport Vehicles (Article 28.3E – ER). HW transport vehicles must be continuously washed and cleaned after each use according to the instructions set by the Ministry of Health in coordination with the concerned competent administrative authority.

It should be pointed out that the stipulations of Law 4/1994 and the Executive Regulations with regards to HW transportation do not detail the operational procedures to be followed during transport operations, nor the technical specifications for the means of transport for this type of waste. In this regard, HW transportation guidelines were developed by EEAA presenting the operational procedures to be followed for ensuring proper control of transport operations and effective tracking of transported waste; the necessary technical and safety specifications and equipment of the means of transport; as well as the general operational provisions ensuring the safe handling of the waste during the transportation operations.

5.2.5 Protection of Water Resources

Law 48/1982 and its Executive Regulations focus on protecting potable water and non-potable/agriculture use water from pollution. These waters include the Nile River, all irrigation canals, drains, and lakes. The water quality standards are shown in Table 5.4.

Law 93/1962 sets the conditions for discharge of wastewater on public sewers.

5.2.6 Work Environment

Due to the importance of workers health and safety, both the Egyptian Law of the Environment (Law 4/1994) and the Labor Law (Law 137/1981) regulate different issues related to workers in work places. As indicated by Articles 43 through 45 of Law 4/1994, protective equipment must be provided to workers at the project site.

Safety and occupational health issues are also addressed in Chapter 5 of Law 137/1981, Labor Law.

5.3 Site Specific Clean-up Levels

Remediation and clean-up goals for lead have not been established in Egypt. Several meetings held between Life-Lead and the EEAA's Environmental Quality Sector, Hazardous Waste Department, and the Environmental Health Department to discuss and agree on procedures to establish clean-up levels. The consensus was reached that clean-up levels would be set on a site-specific basis based on the results of baseline human health risk assessment.

Table 5.4: Water Quality Standards for Fresh Water Bodies

Parameter	Limits (mg/l)
Color	100 NTU
Temperature	5°C above normal temp.
Total Solids	500
Dissolved oxygen	Not less than 5
pH	Not less than 7 nor more than 8.5
Biological Oxygen Demand (BOD)	6
Chemical Oxygen Demand (COD)	10
Organic Nitrogen	1
Ammonia	0.5
Oil and Grease	0.1
Total Alkalinity	Not less than 20 and not more than 150
Sulfates	200
Mercury compounds	0.001
Iron	1
Manganese	0.5
Copper	1
Zinc	1
Detergents	0.5
Nitrates	45
Fluorides	0.5
Phenol	0.02
Arsenic	0.05
Cadmium	0.01
Chromium	0.05
Lead	0.05
Selenium	0.01

The non-carcinogenic HI for workers at the El Mahy Smelter is 96 and the carcinogenic risk to workers at this smelter is 6×10^{-4}. These health risks are due to lead, antimony, and arsenic. Blood lead modeling showed that 100% of the workers are expected to have blood lead levels greater than 10 µg/dl. These risk estimates indicate that corrective action is necessary.

5.3.1 Results of the Adult Lead Model

Based on results of the Adult Lead Model and USEPA guidance, the proposed risk-based remediation goals (RBRGs) for lead were calculated to meet recommendations of USEPA, limiting exposure to soil lead levels at industrial/commercial sites to be protective to the fetus of a pregnant female worker so that no more than 5 percent probability that fetuses exposed to lead would exceed a blood lead level of 10 microgram lead per deciliter blood.

The RBRGs based on a 10% probability of exceeding a blood lead level of 10 microgram lead per deciliter blood are presented as an upper bound. The resulting RBRGs are shown in Table 5.5.

Table 5.5: Proposed Risk-Based Remediation Goals (RBRGs) for Lead

Media	Industrial
Lead (Pb) in soil	1,100-1,500 mg/kg

Egypt currently does not have standards for lead in dust wipe samples, so the project has proposed clean-up levels based on USEPA standards. USEPA only has dust wipe standards for residential dwellings. These standards are 40 $\mu g/ft^2$ for floors and 250 $\mu g/ft^2$ for windowsills. The project proposes to use 500 $\mu g/ft^2$ standard for dust wipe samples from interior walls and the perimeter walls.

6. ALTERNATIVE REMEDIATION ACTIONS

All proposed alternatives (except the No-Action Alternative) are capable of meeting the health based clean-up goals of the project. The No-Action Alternative is proposed to provide a comparison of the benefits provided by the remediation alternatives. The selected alternative is described in Section 2.3. The following provides a summary description of the other alternatives evaluated.

- **Alternative 1: No Action.**

- **Alternative 2: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles/Remove Equipment.** Alternative 2 is similar to the proposed action described in Section 2.3 except that it does not include soil remediation.

- **Alternative 3: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles/Remove Equipment, Excavate/Dispose Offsite as Hazardous Waste/Cap.** This is the proposed action described in Section 2.3.

- **Alternative 4: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles/Remove Equipment, Excavate/ Stabilize /Dispose Offsite as Non-Hazardous Waste/Cap.** Alternative 4 is similar to the proposed action described in Section 2.3 except that excavated soil will be stabilized before being used in backfilling. Extra quantities of stabilized soil will be hauled to Abu Zabaal Landfill.

7. POTENTIAL ENVIRONMENTAL IMPACTS

7.1 Identification and Assessment Methodology

The impact identification and assessment methodology (Exhibit 7.1) starts with identifying potential primary environmental impacts caused by the proposed remediation alternatives. This is carried out using a modified version of the Leopold Matrix (Table 7.1). Impact identification was based on the analysis of project specifications and baseline information collected in the field, literature review and internet searches of similar projects, interviews with governmental and non-governmental stakeholders as well as information received from stakeholders during the Scoping Meeting (Life-Lead Scoping Report, 2005).

The interactive scoping matrix was used to pinpoint areas where project activities would interact with components of the receiving environment (potential impacts). These could be both positive or negative interactions. The layout of the matrix is arranged as follows:

- The "y" axis of the matrix consists of a list of remediation activities. It also contains in a parallel column a list of aspects associated with each activity or group of activities.

- The "x" axis consists of the resources and receptors encountered in the receiving environment including its physical, biological, and socio-economic components. Resources and/or receptors of the receiving environment include the following:

  - Air quality.
  - Noise.
  - Soil quality.
  - Surface water quality.
  - Groundwater quality.
  - Terrestrial life.
  - Aquatic life.
  - Public health and safety.
  - Employment and training.
  - Work place health and safety.
  - Traffic.
  - Utilities.
  - Livelihood.

Using this matrix, interaction between project activities and environmental components were identified. The identified interactions are then subjected to further analysis to examine whether they produce direct effects on the environment (primary impacts) or they would trigger sequential events that would finally affect other environmental receptors (secondary and higher order impacts). Here, the EIA methods used are network and expert judgment.

The identified impacts were then subjected to a process of impact evaluation. Impact evaluation was based on pre-established criteria including:

- Magnitude of the impact.
- Impact duration.

- Reversibility of the effect on receptor.
- Spatial extent.
- Sensitivity or importance of the receptor.
- Zone of effect.
- Availability of mitigation measures.

A comparative analysis between the four remediation alternatives, with respect to the identified significant impacts, is carried out. Based on this analysis, the alternative(s) with the least significant impacts on the environment and which are easy to mitigate and/or mange are selected.

Significant environmental impacts of the selected alternative were subjected to further analysis for consideration of alternative mitigation measures, while insignificant impacts were not considered further. Mitigation measures were either incorporated as an integral part of the design or through management measures.

A monitoring plan was then formulated to ensure that project performance meets the standards and that the mitigation measures effectively achieves the desired level of impact minimization.

7.2 Key Sensitivities

A key input in the process of impact assessment is the identification of the sensitivities and constraints specific to the receiving environment. Potential impacts are usually evaluated in respect to their effects on specific receptors. Therefore, knowledge and information on the environment within which the proposed project will be located are essential.

The EIA team has gathered sufficient information on the project area and has analyzed their sensitivities as a crucial step in the assessment process. This information was gathered through literature reviews, interviews with officials and local residents, satellite image analysis, aerial photography analysis, and field surveys.

The sensitivity or importance of the receptors depends on its nature, value, scarcity and zone of effect, etc. They can be categorized as follows:

- On site receptors such as soil, workplace health.

- Receptors surrounding the site such as ambient air, noise, public health.

- Final sinks/receptors such as surface and groundwater qualities. Impacts on these receptors are usually indirect (secondary/tertiary).

The network diagram (Exhibit 7.2) shows that dust emissions caused by the act of wind will primarily affect the ambient air quality. It could then deposit on the soil and surface water and potentially leach to the groundwater. Lead dust deposited on the soil could also affect public and/or workers health through direct contact. Human health could also be impacted through the inhalation of lead dust or the ingestion of contaminated groundwater or surface water.

Exhibit 7.1: Impact Identification, Evaluation, and Mitigation Framework

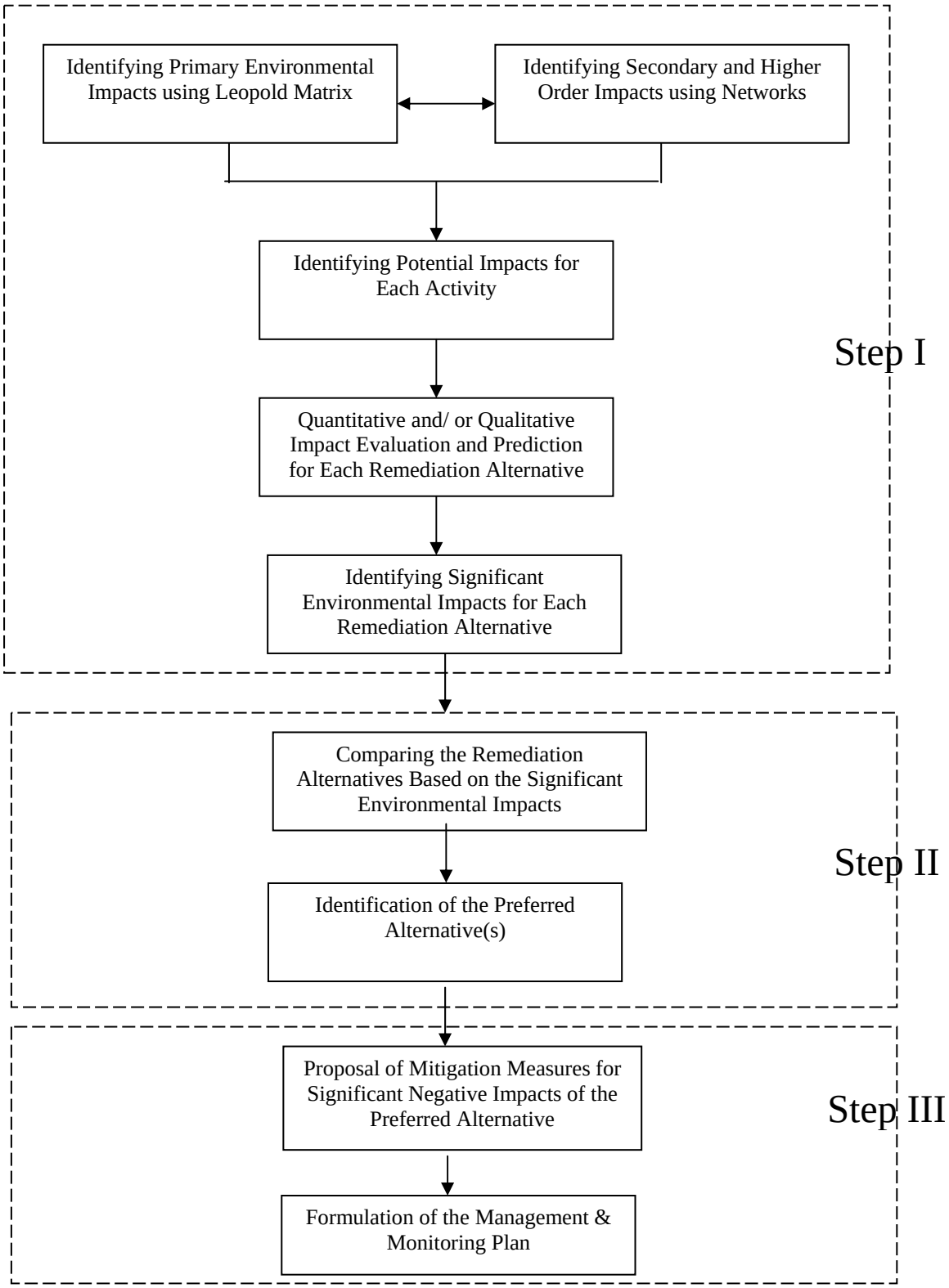


Exhibit 7.2: Ecological Pathways Leading to First and Higher Order Environmental Impacts (primarily due to lead dust)

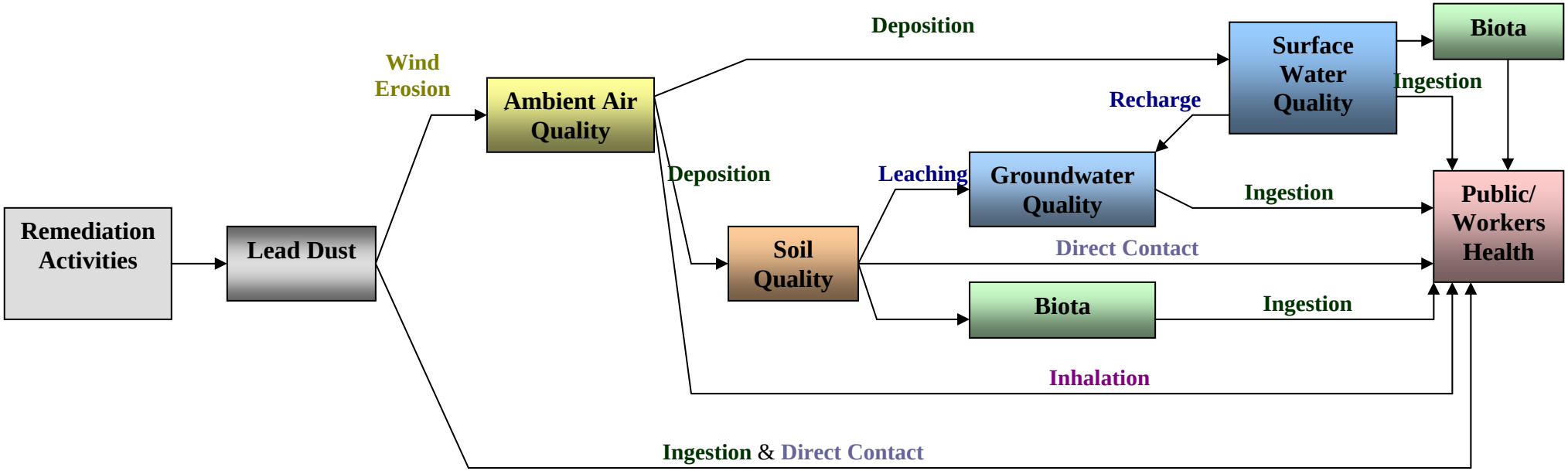


Table 7.1: Summary of Potential Environmental Impacts During Remediation of El Mahy Smelter

Activities (Sources of Impacts)	Aspects	Environmental Attributes											
		Physical Environment					Biological Environment		Socio-economic				
		Air Quality	Noise	Soil Quality	Groundwater Quality	Surface Water Quality	Terrestrial Life	Aquatic life	Public Health & Safety	Employment	Work place Health &Safety	Traffic	Utilities
Shoubra El Kheima													
Alternative 1: No action	• Pollution sources persist	-	NA	-	-	-	-	-	-	NA	NA	NA	NA
Alternative 2,3,4: Construction of Decontamination Pad and temporary Containment	• Dust Emissions • Emissions and Noise (vehicles & equipment)	-	-	NA	NA	NA	NA	NA	-	+	-	NA	-
Alternative 2,3,4: Pressure Washing of Walls and Equipment	• Wastewater • Emissions and Noise (vehicles & equipment)	-	-	-	-	NA	NA	NA	NA	+	-	NA	-
Alternatives 2,3,4: Dry Vacuum Cleaning of Walls and Equipment	• Dust Emissions • Emissions and Noise (vehicles and equipment) • Polluted Filters	-	-	-	NA	NA	NA	NA	NA	+	-	NA	NA
Alternative 2,3,4: Decontamination and dismantlement of Equipment	• Wastewater • Emissions and Noise (vehicles and equipment)	-	-	-	-	NA	NA	NA	NA	+	-	NA	-
Alternative 2,3, 4: Demolition of Walls and Stack	• Dust Emissions • Emissions and Noise (vehicles and equipment) • Demolition Waste • Accidents	-	-	-	NA	NA	NA	NA	-	+	-	NA	NA
Alternatives 2,3,4: Containment/Storage of Waste on Site	• Dust Emissions • Spills of Wastewater and solid waste (hazardous and non-hazardous)	-	NA	-	-	NA	NA	NA	-	+	-	NA	-
Alternatives 2,3,4: Transportation of Material, Labor and Equipment to Smelter Site	• Dust Emissions • Vehicles Emissions and Noise • Traffic Accidents	-	-	NA	NA	-	-	-	-	+	-	-	NA
Alternatives 2,3,4: Wall Painting	• Waste paint and solvents • Emission of volatile vapors	NA	NA	NA	NA	NA	NA	NA	NA	+	-	NA	NA
Alternatives 3,4: Soil Removal/ Excavation and backfill	• Dust Emissions • Emissions and Noise (vehicles and equipment) • Contaminated soil (temporary storage on site)	-	-	+/-	-	NA	NA	NA	-	+	-	NA	-
Alternative 3, 4: Application of Protective Concrete Cap	• Dust Emissions • Emissions and Noise (vehicles and equipment) • Waste concrete, packing material	-	-	+/-	NA	NA	NA	NA	-	+	-	NA	NA
Alternative 4: On-site soil treatment & backfill	• Dust Emissions • Emissions and Noise (vehicles and equipment) • Increase in soil volume (10-15%) • Non hazardous soil	-	-	+/-	-	NA	NA	NA	-	+	-	NA	-
Route from Smelter to the Alexandria Hazardous Waste Landfill													
Transportation of Contaminated Debris, Soil, Hazardous Waste to Alexandria	• Dust Emissions • Vehicles Emissions and Noise • Traffic Accidents • Spillage of hazardous waste or contaminated soil	-	-	-	NA	-	-	-	-	+	-	-	NA
Route from Smelter to the Abu Zaabal Landfill													
Transportation of Non-hazardous Waste to Abu Zabaal	• Dust Emissions • Vehicles Emissions and Noise • Traffic Accidents	-	-	-	NA	-	-	-	-	+	-	-	NA

- Negative Impact + Positive Impact NA Not Applicable

7.3 Impact Evaluation

After considering the project interaction with the previously described receptors, certain interactions with other receptors still remain. These include primary and higher order impacts of the proposed project. Such impacts were then evaluated based on the following criteria:

- Magnitude of the impact.
- Impact duration.
- Reversibility of the effect on receptor.
- Spatial extent.
- Sensitivity or importance of the receptor.

The impact evaluation also takes into consideration the mitigation measures included in the Front End Engineering and Design (FEED) to which the project is committed. This is in addition to measures of good international practice.

7.3.1 Positive Impacts

Remediation of existing polluted sites will lead to the following long-term positive impacts:

- Remediation of existing polluted sites will lead to long-term improvement in the soil and groundwater quality within the remediated sites and in the neighborhood due to the removal and/or treatment of the contaminated soil.

- Improvement of the overall public health of the lead smelter area through the removal/treatment of the persistent source of lead hazard.

- Improvement of the quality of life due to improvement of the air quality in the project area.

- Remediation of smelters will lead to new employment opportunities for the local community during the period of site remediation. Wages will be paid to local labor as the remediation activities are implemented.

- This is one of the first site remediation projects in Egypt and it is anticipated to initiate new hazardous waste site remediation businesses. A cadre of specialized construction contractors and workers has been trained as part of the project to remediate lead and other contaminated sites.

- Appreciation the value of land in Shoubra El Kheima due to improvement of the health and environmental quality of the area. The property in the area is changing from industrial to residential causing property values to increase significantly. The remediation of these sites will lead to increased property value throughout the area.

7.3.2 No Impacts

Examination of the environmental setting of the area in which the project is located has shown that project activities will not interact with some of the receptors and so there will be no direct impact on these receptors including:

- Impact of On-site Remediation Activities on Terrestrial Life. The smelters lie within an industrial area that is devoid of sensitive terrestrial fauna and flora except for some common trees and plants that already have lead dust deposited on their leaves. Remediation activities will not therefore have any additional direct impacts on terrestrial life.

- Impact of the On-site Remediation Activities on Surface Water Quality and Marine Life. All remediation activities that will be carried within the smelters boundaries will be contained within the site and thus there will be no direct impact on the Ismailia Canal or its aquatic life.

7.3.3 Negative Impacts

A number of potential negative impacts associated with on site remediation activities and transportation of waste to final disposal are evaluated below. Insignificant impacts are disregarded while mitigation measures are proposed to prevent/minimize significant negative impacts.

Air quality (Short Term Direct Avoidable Negative Impacts)

The ambient air quality at the project site may be impacted by gaseous emissions and fugitive dusts from remediation activities. The main sources of emissions on site include the following:

- Decontamination activities.
- Vacuum cleaning and pressure washing.
- Demolition of existing structures
- Soil excavation and backfilling operations
- Wind erosion of exposed waste material or soil.
- Construction equipment and machinery

Transportation of raw material, labor and equipment to the smelters sites and transportation of the contaminated waste from the smelters sites to its final disposal site will have impacts on the air quality levels along the transportation route.

Mitigation Measures--

Highly pressurized water shall be used for structure and wall decontamination. No dust emission is expected during operation. The contaminated water shall be collected in sedimentation tanks, left to settle for 72 hours, and then samples are tested before discharge to the public sewers to meet the requirements of Law 93/1962 for discharge of wastewater on public sewers.

Sludge shall be transferred to the Hazardous Waste Landfill in Alexandria.

To contain dust generation during remediation and clean-up activities, decontamination areas will be established to isolate the activities and prevent lead contaminated dust from emitting to the atmosphere (Exhibit 7.3). The decontamination areas will be equipped with centralized dust collection systems to capture, transport, and separate dust emitted from the processing and materials handling areas through reverse pulse dust filters. Collected dust will be properly handled and stored in closed containers until it is transported with the waste soil to the appropriate disposal site.

Dust generated during demolition and excavation activities will be controlled with windscreens (plastic sheets) and water spraying to suppress dust as needed. As for transportation, the trucks will be lined and covered with thick poly-ethylene sheets.

Life-Lead will monitor the contractor's implementation of mitigation measures throughout the project. The mitigation measures will include dust suppression measures at the site by watering of haulage roads, and maintaining machinery and vehicles in a working condition to minimize fugitive emissions. All equipment will be frequently inspected and maintained to ensure no fugitive emissions are generated, such as volatile hydrocarbon or nitrogen oxides.

Residual Impact--

Acceptable under normal operation conditions, however, regular periodic monitoring is done to insure compliance to standards.

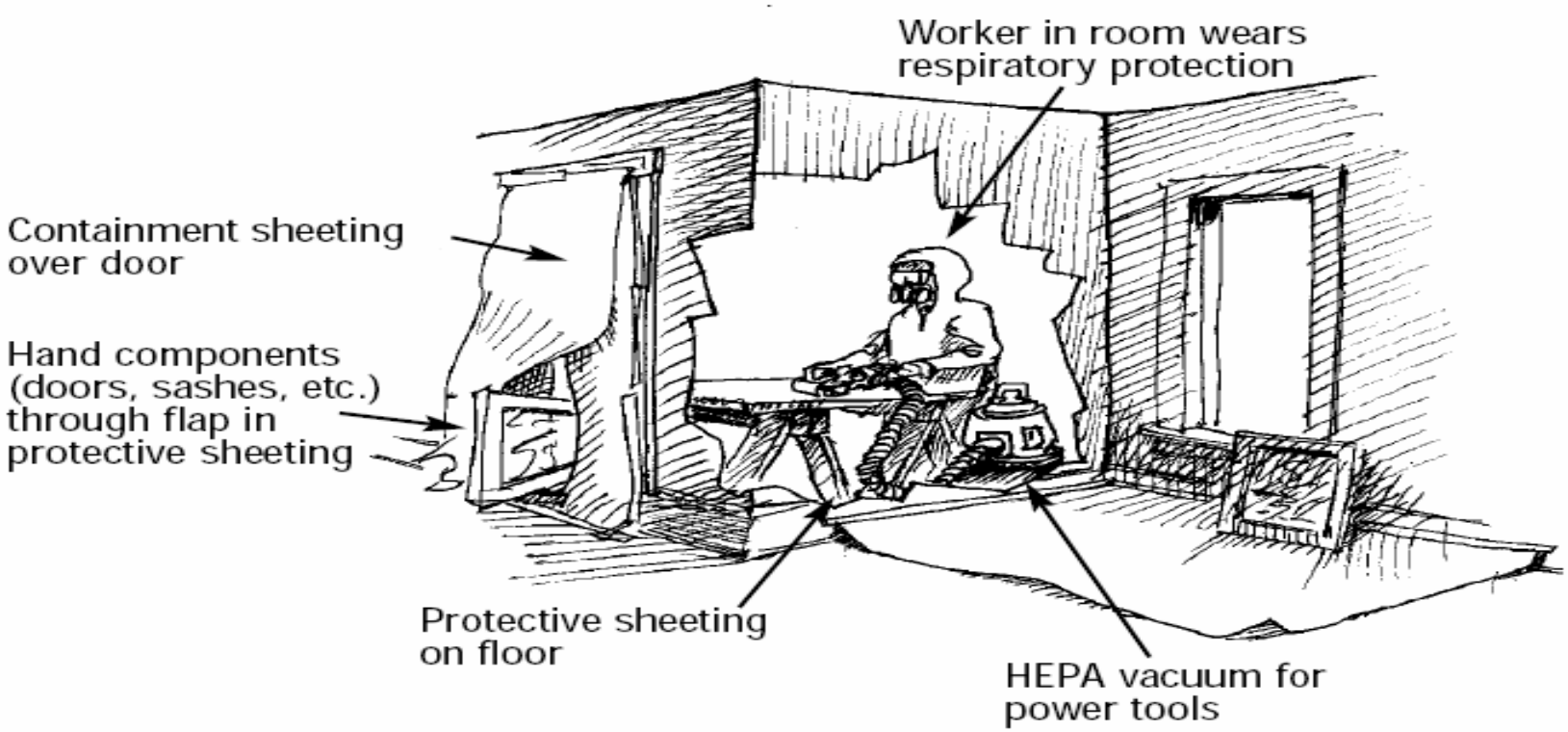
Noise (Short Term Direct Avoidable Negative Impacts)

During the implementation of the remediation activity, noise will arise mainly from the equipment used for concrete cutting, placement, and compaction. Also the equipment used for dry and wet buildings cleanings (e.g., High Efficient Particulate Air (HEPA)) are another source of noise. Table 7.2 shows the average noise level, in decibels, at a distance of 20 m between an observer and the source of noise.

Table 7.2 Average Noise Levels from Construction Equipment (in decibels) at a Distance of 20 m between Observer and Machinery

Equipment Type	Average Noise Level (decibels) at 20 m
Loader	78
Vibration Roller	74
Sprayer	75
Generator	86
Impact Drill	75
Concreter Mixer	79
Pneumatic Hammer	86

Exhibit 7.3: Containment of Indoor Remediation Activities



The remediation activity will result in an increase in the traffic load, especially heavy traffic such as buses and trucks used for the transportation of workers and material to and from site, and transportation of the generated waste to the disposal sites. This will lead to an increasing neighborhood noise levels.

Mitigation Measures--

When construction equipment is used, such as during the site excavation, earth moving, and land grading, workers at distances less than 5 m from the construction equipment must wear ear protective equipment to minimize possible impacts from noise.

Equipment and transportation vehicles are periodically maintained to minimize noise levels to design limits. Monitoring will ensure that the noise levels are kept below legal limits set forth in Law 4/1994.

Residual Impact--

Acceptable under normal operation conditions, however, regular periodic monitoring is done to ensure compliance to standards.

Soil (Short Term Direct Avoidable Negative Impacts)

The impact on soil quality from clean-up and decontamination activities of the smelter buildings can only result if contaminated dust emissions or debris are allowed to deposit on the soil or through spills or leakage of contaminated wastewater (from washing activities) or fuel to the soil.

The impacts on the soil within the smelter boundary from soil removal, backfilling and then capping will have a positive, rather than a negative impact, on the soil quality that was treated. However, dust resulting from excavation and hauling of soil may have negative impacts on the soil quality out of the smelter boundaries if it is not prevented from forming or not properly contained.

Moreover, the soil quality along the transportation routes to the smelter and from the smelter to the disposal sites could be negatively impacted if the transported material or waste was not properly contained or if contaminated emissions were wind blown and deposited on soil. This impact could be significant if the soil on which the contaminated dust deposit is of high economic value (e.g., agricultural land).

Mitigation Measures--

All liquid and solid waste as well as fuel and chemicals used, during site remediation will be properly stored above ground and contained to avoid spills and leaks to the soil. The storage tanks will be frequently inspected for leaks and damage.

Residual Impacts--

Acceptable if mitigation measures are applied and site management practices are applied.

Groundwater (Short Term Direct Avoidable Negative Impacts)

There will be no direct contact between the remediation and clean-up activities carried out within the smelters buildings and the groundwater. The only activity that can pose a potential source of contamination to groundwater is soil excavation.

Mitigation Measures--

Excavation of the soil within the smelter will reach a depth of 0.5 m. As for the hot spots (e.g., in the rotary furnace area) excavation will proceed in parallel with XRF testing to determine the exact depth of excavation. In any case excavation will not exceed 3 m. depth. This is still about 1.5 m away from the top of groundwater.

Residual Impacts--

Acceptable under normal operating conditions, however, regular periodic monitoring is done to unsure compliance to standards.

Surface Water Quality and Marine Life (Short Term Direct/ Indirect Avoidable Negative Impacts)

The water quality of surface water bodies such as the Ismailia Canal may be negatively impacted during transportation of raw material to the smelters sites and especially during transportation of contaminated waste from the smelters to the disposal site. This could be as a result of the deposition of wind blown dust on the surface water or direct spills into the canal in case of traffic accidents.

Mitigation Measures--

The risk of polluting surface water bodies (i.e., Ismailia Canal) and affecting its marine life could be mitigated through the following:

- Provision of containment and cover for transported waste to prevent dust from becoming wind blown and depositing on the neighboring water body.

- Following planning and emergency response measures provided in Section 8.5 to minimize risk of accidental spills.

Residual Impacts--

Acceptable under normal operation conditions, however, regular periodic monitoring is done to unsure compliance to standards.

Public Health and Safety (Short Term Direct/Indirect Avoidable Negative Impacts)

Remediation activities especially those done outside the contamination chambers such as soil excavation and demolition activities could disturb the neighboring residents and impact their health through inhalation of released emissions or dust or through oral intake if the contaminant reaches the food chain.

Public health and safety could be jeopardized by the risk of accidents due to increased traffic in the smelters areas and along the transportation routes to disposal sites. There is also the risk of accidents from falling debris during stack demolition.

Mitigation Measures--

The project is located in an industrial area where the residents live with noise and dust that may not occur in other residential areas. In addition, air pollution controls will be provided as mentioned earlier. Containment of remediation activities and the establishment of decontamination chambers during smelters remediation and clean-up activities as well as dust suppression measures such as water spraying will greatly reduce the impact on neighboring communities.

Workers will not be allowed to leave the work site wearing lead contaminated clothing and equipment to prevent it from reaching the workers' homes and vehicles. This will reduce the movement of lead contamination from the workplace into a worker's home and provide added protection to employee's families and neighbors.

Training of drivers on defensive driving and frequent inspection of the haul trucks will greatly reduce the risk of accidents.

As for stack demolition, the following measures will reduce the risk of falling debris:

- Demolition will be done manually.
- The scaffold around the stack will be covered.
- Debris netting will be installed below the working platform.
- Build up of debris will not be allowed. It will be progressively removed, loaded to a crane lifted bucket, and lowered to ground to be prepared for safe disposal as hazardous waste. Demolished materials will not be allowed to fall freely.
- The area around the stack will be roped off or barricaded and secured with appropriate warnings. Unauthorized entry to this area will not be permitted.

Residual Impacts--

Acceptable if mitigation measures are applied and site management practices are applied.

Work Place Health and Safety (Short Term Direct Avoidable Negative Impacts)

Workers health could be affected during the remediation project through the following:

- Inhalation of lead contaminated dust during building cleaning.
- Direct contact with contaminated soil, waste piles, or contaminated walls, floors, and ceilings.
- Inhalation of exhaust gases caused by transportation activities or utilized equipment.

- Accidents especially during demolition of the stack.

- Spill of solvents or other harmful materials.

Mitigation Measures--

The Life-Lead Site Engineer will have continuous presence on-site for close inspection and management of the construction activities. The contractors will apply a number of control measures including the following:

- Contractor's employees involved in any facility remediation of lead contaminated sites must have received Health and Safety Training in the form provided by LIFE-Lead to the pre-qualified contractors. The Contractors must verify that the nominated Project Manager has provided Health and Safety of Hazardous Waste Operations Training to contractor employees working on the project. The contractor must, at a minimum, provide all required personal protection equipment (PPE), personal decontamination stations, personal medical monitoring, air monitoring, and required record keeping.

- The General Health and Safety Plan will be required as part of the bid submittal whereas the Site Specific Heath Safety Plans will be required after Notice of Award.

- The contractor will provide documentation and results that all medical monitoring has been conducted prior, during, and after the project; and provide records of air monitoring results.

- Engineering control (e.g., the design of the decontamination areas in which the workers will operate will ensure proper ventilation and dust collection).

- The workers and visitors will use appropriate PPE at all times.

- Personnel working at heights over 2 m above the ground surface and in the demolition of the stack will use personal fall protection equipment and safety nets. A back rail one meter (1m) above the platform will be installed covered with canvas or mesh around the perimeter of the platform to prevent injury to workers.

- Flammable material will be stored in an isolated, shaded, and labeled area. Fire extinguishers will be provided in designated places at the site and will be regularly inspected.

- An Emergency Response Plan was developed to mitigate the occupational health and safety hazards of the workplace, as presented in Section 8.5 below.

Residual Impacts--

Acceptable, if mitigation measures are applied and site management practices are applied.

Traffic (Short Term Direct Avoidable Negative Impacts)

Heavy traffic during remediation activities will be experienced in the area around the smelter and at the intersection with the main road parallel to the Ismailia Canal during transportation to the disposal site. This could result in traffic congestion and increase the probability of accidents. However, because the duration of remediation activities at the smelter will be relatively short and the Ismailia Canal Road is already a busy road since it is an industrial area, the overall impact on traffic in the area should be minimal.

Risks of vehicle accidents from the hauling of excavated soil and waste from the remediation site to the disposal facilities are included in the Emergency Response Plan. The vehicular risks are addressed by measures such as proper training of drivers on defensive driving and by regular inspection and maintenance of the haul trucks.

Utilities (Short Term Direct Avoidable Negative Impacts)

Water, wastewater, gas pipelines, and electricity cables will not be affected by remediation activities except if soil excavation is deep enough to reach their level. The area layouts would be used to identify if any of these utilities run under the areas where soil will be excavated and to avoid such impacts. The contractor selected to perform the remediation will be responsible for working with the GOQ to identify and verify the location of underground utilities.

7.4 Comparative Analysis of Remediation Alternatives

7.4.1 No-Action Alternative (Alternative 1)

This alternative is not recommended. If remediation activities are not carried out, then the existing lead pollution hazards will persist causing further deterioration of the environmental quality of the area. No-action will also impact the workers in the smelter and the residents of Shoubra El Kheima.

7.4.2 Comparison of Alternatives

Table 7.3 Comparative Analyses of Remediation Alternatives

Short Term Impacts	Long Term Impacts/ Benefits
Alternative 2: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles /Remove Equipment	
Temporary negative impacts on air quality, ambient noise, workplace health, and safety as well as traffic. Contamination on walls will be transferred to soil since the contaminated wash water will be allowed to seep to the soil. No direct impact on surface water quality or biological life.	This alternative will lead to long-term benefits to the environmental quality of the smelter area and public and workers health. It does not include soil remediation. This alternative is considered a partial solution to the problem and is therefore not recommended.
Alternative 3: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles/Remove Equipment, Excavate/Dispose Offsite as Hazardous Waste/Cap	
This alternative will result in incremental short-term environmental impacts to the impacts already encountered in Alternative 2 due to the environmental concerns resulting from the following additional activities: • Excavation, hauling and loading of contaminated soil. • Placement of hard cap. • Transportation of waste soil. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills.	This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public and smelter workers due to the remediation of the two major contaminated media; surfaces of existing structures and soil. From an environmental standpoint, this alternative is recommended

Table 7.3 Comparative Analyses of Remediation Alternatives

Short Term Impacts	Long Term Impacts/ Benefits
Alternative 4: Institutional/Engineering Controls, Decontaminate Structures, Equipment, Piles/Remove Equipment, Excavate/Stabilize/Dispose Offsite as Non-Hazardous Waste/ Cap	
This alternative will result in incremental short-term environmental impacts to the impacts already encountered in Alternative 2 due to the environmental concerns resulting from the following additional activities: • Excavation and stabilization of soil. • Backfilling with stabilized soil and/or structure backfill. • Hauling and loading of extra-uncontaminated soil. • Placement of hard cap. • Transportation of waste soil. Environmental concerns associated with these activities include increased dust and fugitive emissions, noise, traffic, transportation accidents, and spills. However, a smaller volume of contaminated material will reach the Alexandria Hazardous Waste Landfill. This will decrease the impacts associated with handling and transportation of contaminated soil.	This alternative will result in long-term environmental benefits to the environmental quality of the area and the health of the public and smelter workers due to the remediation of the two major contaminated media; surfaces of existing structures and soil . From an environmental standpoint, this alternative is recommended

From an environmental standpoint, Alternatives 3 and 4 are equally recommended. The choice of the proposed alternative depends on other factors that include effectiveness, implementability, and cost. The cost factor provides a decisive criterion for choosing among different alternatives. The objective of the financial analysis is to estimate the present value of the expected cost of the four alternatives under investigation, in order to propose the alternative with the most cost effectiveness. The proposed alternatives with appropriate mitigation and monitoring measures should be implemented.

Prior to the beginning of remediation, baseline environmental conditions will be defined for monitoring during the remediation activities. Baseline conditions will be established for air quality, noise, soil, surface water, and groundwater. The baseline conditions will be used to monitor the remediation activities impact to the environment and to insure that mitigation measures are established and functioning properly.

8. ENVIRONMENTAL MANAGEMENT PLAN

8.1 Purpose

The Environmental Management Plan (EMP) consists of a set of mitigation, monitoring, and institutional measures to be taken into consideration during and after the implementation phase. This aims at eliminating adverse environmental and social impacts and preventing or reducing them to acceptable levels. The plan also includes the actions needed to be taken to implement these measures.

In addition, the EMP aims at measuring and reporting environmental performance as part of a continuous improvement process; creating a climate of transparency and strategic partnerships with key stakeholders and developing effective training in order to raise public environmental awareness.

The EMP will be regularly updated by the project team to reflect the ongoing activities in the site. The EMP will be reviewed and revised according to various project activities. For each of the project activities, the EMP will list the requirements to ensure effective mitigation of each relevant potential impact.

8.2 EMP Components

The EMP consists of the following components:

- Mitigation measures to identify feasible and cost effective measures that will reduce potentially significant adverse environmental impacts to acceptable levels.

- Monitoring and validation during and after project implementation to provide information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures.

- Emergency response plan to manage risks that might occur during the different project phases.

- Capacity development and training of the project workforce to support timely and effective implementation of environmental project components and mitigation measures.

8.3 Management Measures

Environmental management of the project started early in its life cycle with a “prevention” rather than “mitigation” approach. This proactive approach ensured that as many impacts as possible are taken into consideration in the planning phase and therefore are already mitigated.

Other impacts were mitigated by the incorporation of mitigation measures in the project design and others through the incorporation of management measures. Management principles that will be integrated in the specific management plans during the different project stages include the following.

8.3.1 Commissioning Phase

The Commissioning Phase of the project is divided into Health and Safety Training and Capacity Building as described below.

Health and Safety

The following health and safety issues will be incorporated into the Environmental Plan of Action:

- Assign a project Health and Safety Manager.
- Assign responsibilities within the contractor and project's supervision team.
- Surround specific hazardous areas of the installation site with a fence to prevent unauthorized access to the site.
- Inform local residents and other users of the area of the equipment installation and construction schedule.

Training and Capacity Building

Training for contractors concentrated on the following main topics:

- Health and safety of workers and the public.
- Remediation technologies and methods to implement differing remediation options.

This training concentrated on the two main topics listed above. Areas that were included in the training included the following:

- Introduction to hazardous waste remediation requirements in Egypt.
- Evaluation of hazardous materials and wastes.
- Design/remediation of hazardous waste and contaminated properties.
- Specialized safety measures for hazardous waste site remediation.
- Environmental compliance monitoring.
- Hazardous waste remediation business opportunities in Egypt.

8.3.2 Implementation Phase

The following topics will be included in the Implementation Phase of the Environmental Management Plan.

Health and Safety

The following health and safety topics will be included in the Implementation Phase:

- Regular control of health and safety measures by the contractor and project supervisors.

- Use of personal protection equipment (PPE) including disposal coveralls or washable full-body work clothing, full face or half face air purifying respirators with P3 filters[1], gloves, hard hats, steel-toed leather boots, face shields or safety glasses.

- Adherence to strict public health and safety standards.

- Storage of materials and provision of measures to prevent leaks and spills.

- Labeling of stockpiled material, access control measures to prevent accidental exposure, and the provision of protection equipment and first-aid kits.

- Storage of flammable materials (e.g., solvents), if any, in isolated, shaded, and well ventilated areas.

Emissions Control

The following emission control measures will be included in the Implementation Phase:

- Maintain machinery and vehicles in good working conditions to minimize fugitive emissions.

- Use dust control measures such as water spraying for dust suppression.

Noise Control

Machinery and vehicles will be maintained in good working condition during the Implementation Phase to minimize noise levels.

Inventory Control

A “first-in, first-out” policy will be applied and auxiliary material, such as chemicals will be labeled with their name, date of purchase, and date of expiration.

Housekeeping

The following housekeeping practices will be followed during the Implementation Phase:

- Minimization of the amount of wash water used.
- Minimization of spills during handling, transport, and use of products.

Waste Management

Waste management is a very important consideration since large quantities of contaminated material will be excavated. Responsibility for waste that is generated will be clearly specified and will follow the procedure listed below.

[1] Half face respirator will be used when the concentration of lead in air does not exceed 500 ug/m^3
Full face respirator will be used when the concentration of lead in air up to 2500 ug/m^3
P3 filter is 99.7% efficient against particle size of 0.3 microns in diameter

- Store excavated contaminated soil, waste piles, and other contaminated materials, prior to transportation to the appropriate disposal site in a designated location.
- Transport and dispose the waste produced in the designated and approved disposal sites to minimize negative environmental and health impacts.
- Contain demolition material from the buildings and temporary construction facilities for disposal at the designated disposal location on site.

Maintenance Program

The following procedures will be included in the maintenance program for the Implementation Phase:

- Regular checks and cleaning of equipment to insure proper working order.
- Repair of damaged equipment immediately.
- Maintain records of equipment checks, repairs, cleaning, and equipment failure to minimize equipment breakdown and any associated pollution releases.
- Prepare a maintenance schedule for mechanical work as well as periodic replacement of parts before breakdown occurs.
- Regular control of the compliance of the measures by the designated supervisors.

8.3 Monitoring Plan

The monitoring program is an essential element of the environmental management scheme of the project. It provides information for periodic review and adjustment of the EMP as necessary. This ensures that environmental protection is achieved through early detection of negative environmental impacts.

Monitoring programs will be designed for the different parameters. The monitoring results will be fed into the decision making process as a trigger for the implementation of corrective actions, in order to maintain compliance with environmental laws and regulations, ensure environmental protection, and workplace safety, as well as to ensure appropriate operation of the mitigation measures and management plans. The monitoring results will be included in an environmental register of the project.

All of the monitoring programs will be initiated before equipment installation begins to measure background levels of different parameters; air quality, noise, and groundwater quality. This monitoring information will serve as baseline values for future comparison.

8.4.1 Environmental Monitoring

A monitoring program will be required during and after the implementation of the chosen alternative. Monitoring and analysis during the Implementation Phase will also provide important data for the validation phase of the contaminated land management process.

Within the monitoring program, instrumentation and its detection limits will be specified. Prior to commencement, the monitoring instruments will be checked and calibrated. Monitoring can be carried out by those implementing the chosen alternative or by an independent organization.

Monitoring of Air Quality

As mentioned earlier, degradation of air quality negatively affects human health and the environment. Ambient air quality data in the vicinity of the smelters will be collected prior to the start of remediation, in collaboration between the contractor, LIFE-Lead, and EEAA. This data will be used to monitor air quality during remediation. Therefore, it is important to monitor the air quality parameters that might negatively affect different environmental elements. Parameters that will be monitored include:

- Dust, including total suspended particles and inhalable particulate matter (PM10).
- Lead concentrations

The monitoring plan will include the following:

- Measurements of Particulates Plan.
- Methodology.
- Range and sensitivity.
- Responsible persons.
- Procedure (sample preparation, collection, storage, analysis methods, and calculations).
- Results Tabulated for each parameter

Monitoring of Noise

Operational noise will be monitored during the implementation phase by the contractor. The measurements will take place at the same points identified during the baseline information collection phase (Section 3.1.2).

The monitoring plan will include the following:

- Measurements of Noise Plan.
- Purpose/Scope.
- Responsible persons.
- Procedure (equipment used, results at each point, and results interpretation).

Monitoring of Groundwater Quality

Groundwater samples will be collected from the same representative industrial wells used to collect the baseline groundwater quality data by Life-Lead. Samples will be taken prior to the beginning of the smelter remediation and following the completion of all remediation activities.

Monitoring of Surface Water Quality

Surface water and sediment samples will be collected from different locations along the Ismailia Canal by Life-Lead. The measurements will take place at the same points identified during the collection of baseline data. Sediment samples will be taken from the canal prior to construction activities at the smelter sites and following the completion of all remediation activities. Surface water samples will be taken following the completion of the remediation activities.

Equipment Monitoring

Utilized equipment will be periodically checked to detect any failure or inefficient performance.

8.4.2 Monitoring Program

Life-Lead initiated the necessary environmental analysis activities to address the issues identified for the EIA in December 2004. Table 8.1 provides a detailed schedule for environmental analyses. The baseline data has already been collected in April 2005 and included in this EIA. Additional data detailed in the above sections will be collected prior to and at the end of the remediation activities starting in December 2005. It is worth noting that the monitoring plan is presented for all the sites that will be remediated as part of the Life-Lead project and not only for the EL Mahy smelter site.

Table 8.1: Schedule of Environmental Analyses

Media to be Analyzed	Prior to Remediation	Completion of Remediation
Air Quality	December 2005	Monitoring will be continuous during the remediation process using data provided by EEAA.
Noise	December 2005	Monitoring will be continuous if needed during the remediation process.
Soil	Site characterization conducted on February 2005	May 2006 - Clearance sampling will be conducted following the completion of remediation activities.
Groundwater Quality – Remediation Area	April 2005 December 2005	June 2006 – Following completion of the smelter remediation activities.
Groundwater Quality – Abu Zaabal Landfill	April 2005	June 2006 – Following completion of the smelter remediation activities.

Media to be Analyzed	Prior to Remediation	Completion of Remediation
Surface Water Quality	April 2005 December 2005	June 2006 – Following completion of the smelter remediation activities.
Sediment Sampling – Ismailia Canal	April 2005 December 2005	June 2006 – Following completion of the smelter remediation activities.

8.5 Risk Prevention and Emergency Response Plan

8.5.1 Objectives

The Emergency Response Plan (ERP) was developed to provide the following control measures:

- Identification of potential sources of hazards that may be present during the lead remediation activities.
- Identification of the chain of events that may occur and result in environmental risk.
- Qualitative evaluation of the likelihood of the occurrence of each of these events.
- Qualitative assessment of the severity of the potential consequences.
- Ranking of the environmental risks in terms of severity.
- Recommendation of appropriate mitigation measures and emergency response procedures to properly manage the identified risks.

8.5.2 Applicability

The ERP was developed for the remediation option which was deemed most favorable as a result of the multi-criteria analysis. It has been prepared as a guideline document to provide contractors with procedures that will allow them to identify risk situations and to respond appropriately to emergencies that may occur during project implementation. Life-Lead will require contractors to modify and update the plan periodically during the remediation process as needed. Table 8.2 provides a detailed summary of the environmental risks.

Specific emergency response procedures are developed for each type of emergency situation (e.g., transport accident, fire, etc.) and facilities involved based on the general principles outlined in Table 8.3.

8.5.3 Reporting Procedures

Record-keeping and reporting are important aspects of the Emergency Response Plan. The company will establish a method of reporting incidents involving injuries, property damage, environmental damage, and near accidents. Such information and records will be used for improving response procedures and minimizing and controlling potential hazards. General information that will be recorded is listed below:

- Date, time, and location of the incident or emergency.

- Person or people involved or affected.
- Description of the situation and site conditions.
- Identification and estimated extent of injury, loss, damage, or contamination.
- Actions used to control the extent and severity of the situation.
- Documentation of corrective actions or responses taken to restore or mitigate the situation.

Table 8.2: Summary of Environmental Risks

Hazard Type	Prevention Measure	Hazard Rating	Response (Table 5.3)
Onsite Storage and Handling of Hazardous Materials (All Sites)			
Spills associated with liquids causing impacts to soil and the possibility of fire.	Worker training on chemical handling and storage and provision of proper containment mechanisms	Moderate	SP, ME, FE
Hazards associated with human contact with chemicals.	Workers training, strict operational procedures, and containment practices.	Moderate to high	SP, ME
Decontamination of Building and Building Improvements (All Sites)			
Accidents involving workers slipping, tripping, or falling; and resulting from the use of equipment.	Worker training, use of PPE at all times, exercising common sense, and using harnesses and wires when working on elevated surfaces.	Low to moderate	ME
Transportation Accidents (All Transportation Routes)			
Accidents during transportation causing personal injury and spills onsite or along the road to the final disposal site(s)	Strict safety procedures for drivers, regular vehicle maintenance, appropriate containment of waste while transporting, and vehicle escort service as practicable.	Moderate to high (human error is an important factor that needs to be managed)	TR

8.5.4 Post Emergency Actions

Post emergency activities are designed to provide the following:

- Define the causes of the emergency.
- Assess efficiency of procedures carried out for emergency response.
- Propose mitigation measures required for implementation to prevent reoccurring accidents of this type.
- Determine the need for implementing remediation and/or monitoring measures for the recovery of the affected area.

- Monitor health recovery for those who may have been affected.
- Manage public communications.

The operational ERP provides specific procedures to comply with the above objectives.

Table 8.3: Guidelines for Response Procedures

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
TR	Transportation	Transport within and near the smelters sites, and along long access roads to the Abu Zaabal (non hazardous waste) and the Nasereya (hazardous waste) landfills	Injury or fatality, and spill of transported materials	Notification and containment of spills on-site or near-site as per procedures in Item SP. Medical emergencies will adopt procedures as per Item ME. For fires located along the transport route, the following will be applied: • Each truck will be equipped with a fire extinguisher that will vary depending on the material being shipped. • For small fires, dry chemical CO_2 extinguishers will be used. • For large fires, the fire area will be flooded with water from a distance. The water jet will not be projected over the spilled material. Water will not be used if the material is acidic. Vehicles will be equipped with proper fire extinguishing materials. • The truck will be removed from the fire area if possible without invoking further risk. • Water will be applied to the shipment to cool the sides exposed to flames until the container is within normal temperatures. • Workers will stay at a safe distance from the burning materials.
SP	Spills	Solvents and chemicals used to remove paints. Paint materials for walls.	Potential health hazard due to ingestion, inhalation, or dermal contact. Possible flammability and corrosivity, depending on chemical.	Notification of emergency to the Site Engineer and the Egyptian Environmental Affairs Agency.

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
ME	Medical Emergencies	On site, all activities	Injuries to workers.	The contractor will have a specialized person (or a person of the team) on site and at all times who is trained in the disciplines of first aid, CPR, fire rescue, and evacuation. All workers will be trained in the proper response to specific injuries (e.g., not moving workers with potential spinal injuries). The injured workers will be transported to the local medical facility. The following procedure will be employed at the location of the incident: • Assess the location and severity of the situation • Avoid taking health or safety risks by entering a dangerous or unstable area • Restrict access to the area • Notify the Health and Safety Manager • Assist in extinguishing the fire and securing the area only under the direction of the Health and Safety Manager • Contact the local fire fighting authority to start mobilizing
SF	Slope failure of the excavation pit	Contaminated areas being excavated	Injury to workers	The following procedures will be employed at the location of the incident: • Notification of emergencies to Health and Safety Manager • Definition of danger area • Assessment of the situation, including impacts to the environment and the workers • Attention to injured as per ME • Employment of measures for stabilizing the area

Ref.	Risk Situation	Potential Substances or Facilities Involved	Hazard	Key Elements of the Emergency Response Plan
FE	Fire within project site	Onsite, particularly chemical or fuel storage areas	Fire, with potential subsequent damage to property, injury, or explosion	Fire fighting equipment will be maintained onsite during all site operations. Key procedures within the project site include the following: • Assess the location and severity of the situation. • Avoid taking health or safety risks by entering a dangerous or unstable area. • Address life-threatening issues such as the lack of pulse, blocked air passages, or severe bleeding using basic first aid techniques. • Notify the Health and Safety manager/site manager according to established protocols. • Assist in securing the situation and transporting the victim under the direction of the Health and Safety Manager on site.

8.5.5 Procedures for Revising and Updating the Emergency Response Plan

Prior to the remediation, procedures will be established for consolidating the plan with specific information required for its implementation. This will include specific site information, responsibilities of personnel, contractor information, contact information, etc. Summary sheets will be developed with procedures specific to each main project activity and will be posted in visible locations on the project site. The plan will be updated as required due to changes in relevant information.

8.5.6 Organizational Aspects

Responsibilities

As part of the operational Emergency Response Plan to be developed by the contractor, organizational responsibilities will be assigned to facilitate decision-making, communications, and procedures in the event of an emergency. These procedures will be developed based on the following guidelines:

- All on-site managers will be responsible for implementing procedures in the workplace aimed to do the following:
  - Identifying potential safety issues and environmental risks within their respective workplace.
  - Notifying appropriate personnel in the event of an emergency.
  - Coordinating emergency response procedures.
- An emergency response team will also be formed within the project. They will operate in the field with available resources to control the emergency under the command of the team supervisor and will likely involve the following:
  - Health and Safety Manager or his/her designated replacement.
  - Trained team members.
  - Equipment operators, if required.
  - Third party staff (e.g., subcontractor).
- The contractor will be responsible for identifying risks, designing, and implementing emergency response procedures, assigning responsibilities within their team, and training their employees in their respective work areas.
- The project will apply procedures for verifying that the contractor has taken adequate responsibility for risk management in their respective areas.

Accessibility and First Response Locations

Easy access to and around the site and effective communication systems are critical for successful implementation of the Emergency Response Plan. As part of the operational Emergency Response Plan, a project layout will be developed to show the locations of high hazard areas or facilities, first response facilities, first aid stations, and other pertinent

response facilities. Major medical emergencies that cannot be handled on site will be transported from the site to the nearest hospital, which is the Nasser Medical Institute.

Notification and Communication

Project Site Communication--

The contractor will use an internal communication system involving alarms or short signals that can easily be conveyed by audible signals to alert workers to danger, convey safety information, and maintain site control. Training in the use of the internal communication systems will be provided to all employees as part of the orientation program. During the emergency, the EMS manager will be contacted immediately. The EMS manager will be accessible via mobile phone 24 hours a day by site personnel and will be equipped to handle radio and telecommunication in the event of emergency.

Public Meetings--

Public meetings will be held as required to disseminate relevant information relating to on-site emergencies, situations that could be present public hazards, and information on measures applied by the contractor to control and monitor hazards. Employees, local residents, community leaders, and other stakeholders are contacted as appropriate and invited to attend theses meetings.

9. INTERAGENCY COORDINATION AND PUBLIC CONSULTATION

9.1 Interagency coordination

Interagency coordination is crucial for an effective EIA because environmental issues in their complexity and variety are often inter-sectoral and regional. The authority and responsibility to deal with them (to collect information, prepare plans, approve designs, issue permits, and regulate activities, etc) is spread over a number of agencies at all governmental levels. Consultations for this project began in the scoping phase.

Before project consultations, it was necessary to identify the project's stakeholders. This step was based on careful analysis of the institutional, legal, and administrative framework of this type of project. Preliminary site surveys have also assisted in the identification of the communities affected by the project and of local NGOs with environmental interests in the project. In addition, more stakeholders have been identified during meetings with key agencies and interviews with officials and the public. A list of the stakeholders identified during this process and their relevant interest in the project is given in Table 9.1.

During the course of the present EIA, interagency coordination has been achieved through interagency or individual agency meetings. Meetings at the time of scoping were important to the progress of the EIA. These meetings aimed to provide the following:

- Inform all interested agencies about the project and the intention to prepare an EIA.
- Seek their views throughout the process.
- Identify pertinent issues.
- Discuss any special types of analysis required, data sources, management procedures, responsibilities, and schedules.

Outputs of the consultation/coordination meetings directly assisted in finalizing the scope and depths of the EIA. A summary of the meetings is presented below.

9.1.1 Meetings with Governmental Agencies

Egyptian Environmental Affairs Agency (EEAA)

Working Group on EA/EIA--

An EA/EIA Working Group was formed to facilitate the preparation of the EA. The working group consisted of staff from LIFE-Lead as well as the EEAA and GOQ. The EEAA staff included members from the EIA, Hazardous Waste, Hazardous Substances, Regional Branch, and Industrial Departments. The Working Group meets every other week to prepare and discuss EA/EIA project components.

Table 9.1: Stakeholders and Their Relevant Role/Interest in the Project

Stakeholders	Role/Interest
Egyptian Environmental Affairs Agency (EEAA): • EIA Department • Hazardous Substances • Hazardous Waste Department • Industrial Departments • Environmental Health Department • Cairo Regional Branch Office	Overall coordinating body of monitoring, enforcement and regulating developments through setting the EIA system, the use of hazardous substances in coordination with concerned and responsible authorities, and determining clean-up levels.
Education Directorate and the Agency for Educational Buildings	Discussion of the school activities to be implemented by the project including the sampling activities to be undertaken for the site characterization.
Governorate of Qalyoubia (GoQ)	Legal/administrative role on the local level.
Environmental Management Unit, (GoQ)	Preliminary revision of the EIA to be send to the EEAA.
Shoubra El Kheima East District	Provide some services to the project while considering possible socioeconomic impacts.
NGOs and/or representatives of the public (city council members)	Safeguard the environment and influence decision making.
Scientific communities	Research in related topics and influence decision making through public channels.
Local residents and neighboring smelters	Affected community.

Proposed Remediation Clean-up Goals--

Remediation clean-up goals have not been established in Egypt. Several meetings were held with the EEAA's Environmental Quality Sector, Hazardous Waste Department, and Environmental Health Department to discuss clean-up levels and to agree upon a procedure to establish clean-up levels.

The consensus was reached that clean-up levels would be set on a site specific case based on the results of a Health Risk Assessment. In addition, the EEAA agreed to set action levels that would trigger investigation of a potentially contaminated site.

Meetings with Governorate of Qalyoubia (GOQ)

Weekly meetings were convened with General Farouk Khater, Head of the Shoubra El Kheima East District. Although those regular weekly meetings were for the overall coordination of project activities; issues related to the EA/EIA tasks were also on the agenda at these meetings. General Farouk Khater has also facilitated two site visits for the EA/EIA team to the smelter sites and the Abu Zaabal Landfill in Abu Zaabal.

Education Directorate and the Agency for Educational Buildings

GOQ-Education Department--

A meeting was held on Wednesday, December 1, 2004 in the office of the General Manager of the Education Department in Qalyoubia. The purpose of the meeting was to discuss the school activities to be implemented by the project including the sampling activities to be undertaken for the site characterization.

GOQ-El-Shahid Ahmed Shaalan School--

A meeting was held with El Shahid Ahmed Shaalan school teachers and management on Wednesday, December 8, 2004 and included representatives from the Qalyoubia Education Department. The purpose of the meeting was to inform and coordinate with the school administration the upcoming site characterization activities.

9.1.2 Meetings with the Smelter Owners

During the weekly meetings at the Shoubra El Kheima East District, the smelter owners/ representatives were invited to attend and were present in most meetings. This was a significant factor in opening a forum with them on the different stages of the project. The process of the EA/EIA and the need for a defined future use for the sites were the primary issues discussed with the smelter owners and their representatives.

9.1.3 Meetings with Community Representatives and NGO's

Local NGO's attended the weekly meetings at Shoubra El Kheima East District. A meeting was held with the Community Advisory Committee on Wednesday, January 26, 2005 to obtain their thoughts on the remediation process and to encourage them to attend the Scoping Meeting.

9.1.4 Tripartite Legal Agreement

Tripartite legal agreements were drafted by the project and signed by the smelter owner, EEAA, and the GOQ representatives to stipulate the mutual commitments of all parties. By signing these agreements the smelters owner guarantees access to their facility, declares the planned future use of their land, and commits to cooperate with all project's activities.

9.2 Public Consultations (Scoping Meeting)

Community involvement is also important in order to understand the nature and extent of potential impacts, especially the socio-cultural impacts, and to assess the suitability and acceptability of various measures that might be used to prevent or mitigate impacts, or to compensate affected groups for unavoidable impacts. Community involvement is also useful in the analysis of the distribution of project costs and benefits. A genuine effort is required to provide the public with information about the project and to solicit public reactions and suggestions.

A Scoping Meeting was held on February 2, 2005 in the Shoubra El-Kheima City Council Main Hall. The agenda and list of attendees present at the Scoping Meeting is provided in

Appendix D. The purpose of the Scoping Meeting was to disseminate information about the project to the stakeholders and receive their comments. The meeting introduced the potential environmental issues that would be handled in the EIA.

A scoping comments statement was provided to allow participants an opportunity to comment in writing if they were reluctant to provide verbal comments. The participants were given a week after the session to send their written comments if not provided during the session. During the meeting, a number of concerns were raised. They are already incorporated into the EIA and some of the issues that were raised were highlighted in the baseline surveys. A detailed summary of the participant remarks and scoping statement responses are provided in Appendix E.

The meeting was attended by high-level representatives of the stakeholders. The Governor of Qalyoubiya, H.E. Adly Hussien addressed the meeting in the opening session. Minister of State for Environmental Affairs Dr./Magued George nominated Dr. Fatma Abou Shouk, Head of the Environmental Management Sector in EEAA to represent the Ministry of State for Environmental Affairs and address the meeting. Opening remarks by Mr. Ron Daniel, USAID Environment Office; and Mr. Kirk Ellis, Chief of Party, LIFE-Lead concluded the opening session.

Sixty-five invitations (65) invitations to stakeholders and individuals outside EEAA and the project team were circulated one week prior to the meeting. An announcement for the meeting was posted in the public announcements board at the Shoubra El Kheima East District seven days before the meeting. Fifty-seven (57) participants registered at the meeting. These registrants included the following:

- Twelve (12) from the GOQ or Central Government Departments.
- Twelve (12) representatives from the parliament and the local popular councils.
- Five representatives of Shoubra El-Kheima East District.
- Three representatives from Shoubra El-Kheima West District.
- Six representatives from the Education Directorate Agency for Educational Buildings and School.
- Four representatives from active local NGO’s in East District.
- One representative from the Health Directorate.
- Five representatives from the smelter and foundry owners.
- Seven representatives from Universities, lawyers and consultancies.
- Four representatives from the local media.

In addition, sixteen (16) representatives of EEAA, four representatives from USAID, and 19 members of the LIFE-Lead participated in the meeting.

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APPENDIX A

PROPOSED REMEDIAL TECHNOLOGIES FOR CONTAMINATED SOIL, WASTE PILES, BUILDINGS, STRUCTURES, AND EQUIPMENT

Table 1: Proposed Remedial Technologies for Contaminated Soil- Long List

General Response Action	Remedial Technology	Description
No Action	No Action	The no action alternative provides a baseline against which other alternatives can be compared. Although no remedial action will be carried out, environmental monitoring and institutional controls (IC), which restrict land use, are required in most cases. The simplest form of IC is in a regulatory notice or certification of No Further Action (NFA), where land use restrictions could be imposed by the regulating authority. This alternative includes negotiations between landowner(s) and responsible authorities, establishment of the legal framework necessary to implement the IC, and limited corrective action and/or long-term monitoring of site contamination.
Site Controls	Access Controls Environmental Controls Traffic Controls	Site controls are used in conjunction with short- and/or long-term remediation, and may be a condition of an IC. Site controls may include access controls (e.g., fencing, warning signage, security monitoring, and alarm systems); traffic controls (e.g., regulated speed limits and no stopping zones); and environmental controls (e.g., water use). For this alternative public education and enforcement activities might be required.
Resource Recovery	Recycling	Soil contaminated with elevated lead concentrations could be processed for lead recovery using conventional base metal extraction processes. This involves segregation of high-grade contaminated soil followed by lead extraction by leaching, concentrating, smelting, or electro-winning.

Table 1: Proposed Remedial Technologies for Contaminated Soil (cont.)

General Response Action	Remedial Technology	Description
Treatment	Solidification/ stabilization and off site disposal	Solidification involves the addition of chemical reagents to the contaminated soil and results in the formation of a solid monolithic mass. The contaminants do not necessarily interact chemically with the solidification reagents (e.g. cement/lime), but are physically encapsulated in a solidified matrix. This reduces the accessibility of contaminants to mobilizing agents such as groundwater or storm water. Stabilization technologies use chemical reagents which react with the soil contaminants and transform them into an immobile form. The produced mixture is resistant to leaching. This alternative encompasses contaminated surface and subsurface soil excavation, followed by soil treatment with a pozzolanic stabilization process. If the treated soil is less than the Toxicity Characteristic Leaching Procedure (TCLP) for lead, it can be disposed on site or off-site in a sanitary landfill.
	Soil Washing	Soil washing exploits size, density, surface chemistry and magnetic differences between contaminants, and contaminated and uncontaminated soil particles. Soil washing relies on favorable distribution of soil contaminants (e.g., according to particle size) which can be exploited by separation processes to produce a concentrated fraction. The process starts by screening contaminated soil according to particle size. The larger particles can be washed either by water or solvent and recycled to the site. The smaller particles are washed by a wash solution to suspend or dissolve the contaminants into the solution or to concentrate the contaminants into the sludge remaining from this treatment process. While in the former case, the wastewater must be treated, in the later case the sludge must be disposed off appropriately in a landfill site. This technique involves excavation of contaminated soil, followed by soil washing with a solution (nitric acid or EDTA), where treated soil is returned to the site for disposal in the excavated area. Produced wastewater requires post treatment.

Table 1: Proposed Remedial Technologies for Contaminated Soil (cont.)

General Response Action	Remedial Technology	Description
Containment	Capping/ Covering	A cap is an engineered barrier of asphalt, concrete, heavy-duty plastic lining, ca. 40 cm of compacted clay, etc., which is placed over landfills or repositories of consolidated waste to prevent water penetration. Caps usually require some level of long-term monitoring and may include institutional controls (IC)or land use restrictions. This technique involves contaminated soil consolidation into a cell or repository, followed by contouring or grading, and compaction to specifications. A cap is constructed over the completed repository and may consist of several layers depending on requirements. Earthen caps are commonly vegetated and drainage systems are usually included to control stormwater. Sometimes institutional and/or site access controls as well as public education are required.
Removal	Excavation and off site disposal	Solid or semi solid materials can be removed by excavation. This technique could be cost-prohibitive for sites of large volumes, great depth or complex hydro-geologic environments. The feasibility of this process requires knowledge of land disposal restrictions and other regulations developed by the government. Land filling of hazardous material is expensive due to regulatory control. Excavation can be accomplished by a wide range of conventional equipment such as cranes, draglines, dozers, and loaders. The hauling equipment includes scrapers, haulers, dredges, bulldozers, and loaders. Fugitive dust from excavation is commonly controlled by chemical dust suppressants, wind screens, water spraying and other dust control measures.

Table 2: Proposed Remedial Technologies for Waste Piles - Long List

General Response Action	Remedial Technology	Description
No Action	No Action	Similar to the remediation of contaminated soil, the No Action alternative will be used as a baseline against which other alternatives can be compared. This alternative might include environmental monitoring to prevent contaminants from off site migration., institutional control, and/ or limited corrective action.
Treatment	On Site Washing	This process is similar to but less complicated than acid leaching of soil. This process involves waste piles screening and washing with a leaching agent (e.g. nitric acid) to remove lead. The sludge washed from the plastic, ebonite battery casing, and debris is recovered as a by-product. The cleaned plastic casing chips can be sold to a plastic manufacturer for recycling.
Removal	Waste Piles Removal Off-Site Disposal	Waste pile removal and off-site disposal encompasses excavation, removal, transportation, and disposal in a landfill site.
Resource Recovery	Recycling	This process comprises excavation of waste piles, followed by on-site separation of fragments, and recycling of components that can be recycled. Recycling of components may be carried out on site or off-site. During recycling the mixed primary source materials are separated into components of lead fines, plastic, and ebonite.

Table 3: Proposed Remedial Technologies for Buildings, Structures, and Equipment - Long List

General Response Action	Remedial Technology	Description
No Action	No Action	This alternative might involve institutional control, environmental monitoring, and site use restrictions.
Building Demolition	Demolition and Off-site Disposal	This technique involves equipment dismantling into components or manageable pieces. This method separates types of equipment that are not feasible to be decontaminated and have to be disposed off as hazardous waste from that equipment which can be disposed off as non-hazardous waste.
Decontamination	Washing/ Cleaning	Decontamination of structure and equipment includes waste removal, treatment of process equipment, containers, and any other equipment used to treat hazardous waste. The decontamination process will vary based on the materials being decontaminated. There is no regulatory requirement specifying decontamination methods. Among others hydro-blasting, steam cleaning, solvent washings, blasting, and pressure flushing could be used for building structures decontamination. All cleaning residues (e.g., rinse water, sandblasting grit) are hazardous wastes and must be managed accordingly unless it can be demonstrated that these residues are non-hazardous.

APPENDIX B

LOCATIONS OF THE WATER SAMPLING AND BOREHOLE STRATIGRAPHY

Exhibit 1: Locations of the Water Sampling Around the Sites

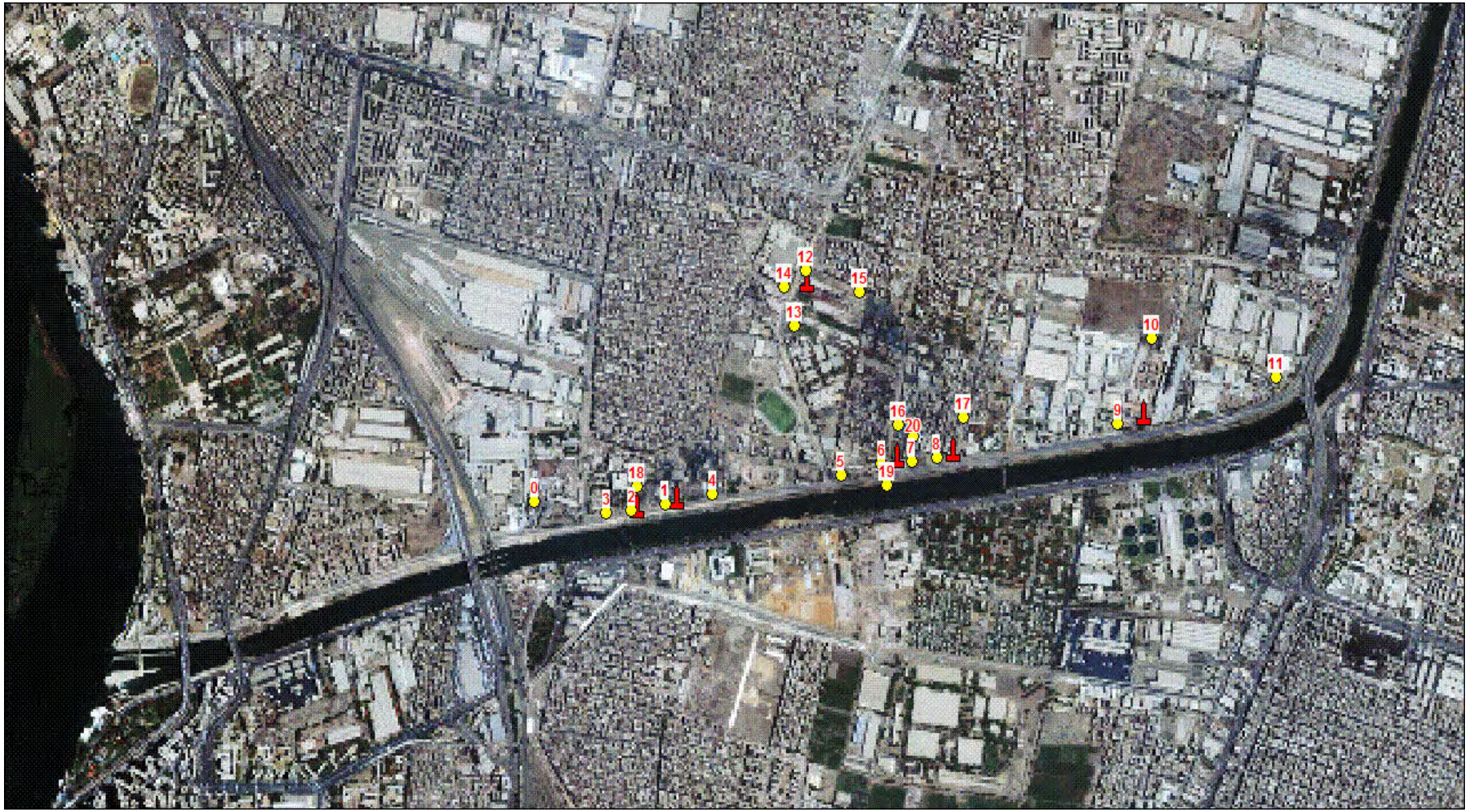

Exhibit 2: Borehole No. 1 at El Mahy Smelter

Project: Life Lead Pollution Clean-up in Shoubra EL-Kheima Qalubiya

BH1

Location: EL Mahy Secondary Lead Smelter

SUBSURFACE PROFILE			SAMPLE	
Depth (m)	Symbol	Description	Elevation	Water Level
0				
0.5		Fill		
1		with red rock fragment		
1.5			-1.5	
1.8		Silty Clay	-1.8	
2				
2.5			-2.5	
3		Brown Stiff Silty Clay		
3.5				
4				
4.5				-4.5
5			-5	

Drill method: Rotary drilling

Drill date: April 2005

Exhibit 3: Borehole No. 2 at El Mahy Smelter

Project: Life Lead Pollution Clean-up in Shoubra EL-Kheima Qalubiya

BH2

Location: EL Mahy Secondary Lead Smelter

SUBSURFACE PROFILE			SAMPLE	
Depth (m)	Symbol	Description	Elevation	Water Level
0				
0.5		Fill		
1				
1.5			-1.5	
2		Silty Clay		
2.5				
3				
3.5				
4				
4.5				-4.70
5			-5	

Drill method: Rotary drilling

Drill date: April 2005

Exhibit 4: Borehole No. 3 at El Mahy Smelter

Project: Life Lead Pollution Clean-up in Shoubra EL-Kheima Qalubiya

BH3

Location: EL Mahy Secondary Lead Smelter

SUBSURFACE PROFILE			SAMPLE	
Depth (m)	Symbol	Description	Elevation	Water Level
0				
0.5		Fill		
1				
1.5				
1.7			-1.7	
2		Reddish Grey Silty Clay		
2.5				
2.7			-2.7	
3		Grey Stiff Silty Clay		
3.5				
4			-4	
4.5		Brown Stiff Silty Clay		
5			-5	

Drill method: Rotary drilling

Drill date: April 2005

Exhibit 5: Borehole No. 4 at El Mahy Smelter

Project: Life Lead Pollution Clean-up in Shoubra EL-Kheima Qalubiya

BH4

Location: EL Mahy Secondary Lead Smelter

SUBSURFACE PROFILE			SAMPLE	
Depth (m)	Symbol	Description	Elevation	Water Level
0				
0.5		Fill	-0.5	
1		Silty	-1	
1.3		Reddish Grey fragment Rock	-1.3	
1.5		Reddish Grey Silty Clay		
2			-2.1	
2.1				
2.5		Brown Stiff Silty Clay		
3				
3.5				
4				
4.5				
5			-5	

Drill method: Rotary drilling

Drill date: April 2005

Exhibit 6: Borehole No. 5 at El Mahy Smelter

Project: Life Lead Pollution Clean-up in Shoubra EL-Kheima Qalubiya

BH5

Location: EL Mahy Secondary Lead Smelter

SUBSURFACE PROFILE			SAMPLE	
Depth (m)	Symbol	Description	Elevation	Water Level
0				
0.5				
1		Fill		
1.5				
2				
2.3			-2.3	
2.5		Grey Silty Clay	-2.6	
2.6				
3				
3.5		Brown Silty Clay		
4				-4
4.5				
5			-5	

Drill method: Rotary drilling

Drill date: April 2005

APPENDIX C

WATER QUALITY ANALYSES RESULTS AT SHOUBRA EL KHEIMA AND ABU ZAABAL

Table 1: Water Quality Data for Shoubra El-Khiema and Abu Zaabal Samples

Location	Sample No.	Type of Sample	Grid Pos. X,Y	Depth m	Time of Sampling	Temp. ºC	pH	Ec µS	TDS mg/l	Alkalinity mg/l	NO2 mg/l	NO3 mg/l	NH4 mg/l
Store at end of Kamal St.	001	Main	0332115 3332316	Unknown	12:00 4/5/2005	23	7.69	320	204.8	145	0.099	22	2.34
Beside Seoudy	101	Main	0332471 3332264	15-17	10:25 4/5/2005	22	7.92	870	556.8	210	0.033	26.4	1.69
	102	Duplicate											
Awadalla Smelter-1	201	Main	0332381 3332262	30+	10:40 4/5/2005	23	7.76	320	204.8	85	0	17.6	1.56
	203	Cross Ref.											
El Elm wa El Iman School	301	Main	0332307 3332258		10:55 4/5/2005	22	7.89	349	223.4	165	0.033	13.2	2.6
Scrap Store Mokhles Anwar	401	Main	0332605 3332291	20-25	11:05 4/5/2005	25	7.79	332	212.5	130	0.033	13.2	1.95
Mobil Fuel Station	501	Main	0333029 3332339	40	11:15 4/5/2005	23	7.55	459	293.8	165	0	22	1.04
	502	Duplicate											
Iron Smelter Essam A. Hamid	601	Main	0333176 3332411	Unknown	11:40 4/5/2005	21	7.72	429	274.6	135	0.066	26.4	1.17
Iron Smelter Saad Tomas	701	Main	0333258 3332439	Unknown	11:50 4/5/2005	23	7.53	456	291.8	185	0	13.2	2.47
El Fotouh Cotton Factory	801	Main	0333256 3332386	25	12:45 4/5/2005	23	8.11	494	316.2	195	0.066	17.6	2.21
Misr for Concrete	901	Main	0333810 3332609	18	13:15 4/5/2005	22	7.88	290	185.6	105	0.033	26.4	1.82
El Ekhwa for Plastic	1001	Main	0334053 3332759	Unknown	13:30 4/5/2005	23	7.47	1190	761.6	305	0.132	13.2	1.56
El Masria for Tanks	1101	Main	0334468 3332578	Unknown	13:40 4/5/2005	22	7.35	1460	934.4	145	0	17.6	1.69
A. ElGabbar Dyeing Co.	1201	Main	0332916 3332954	45	14:10 4/5/2005	21	7.45	1260	806.4	280	0.033	22	2.08
	1203	**Cross Ref.**											
The Honey Factory	1301	Main	0332858 3332726	Unknown	14:30 4/5/2005	22	7.21	340	217.6	100	0.165	22	2.6
Tiba	1401	Main	0332791	70	14:50	22	6.55	740	473.6	110	0.066	30.8	1.95

Location	Sample No.	Type of Sample	Grid Pos. X,Y	Depth m	Time of Sampling	Temp. ºC	pH	Ec µS	TDS mg/l	Alkalinity mg/l	NO2 mg/l	NO3 mg/l	NH4 mg/l
Dyeing Co.			3332946		4/5/2005								
Metal Forming Workshop	1501	Main	0333179 3332808	Unknown	15:15 4/5/2005	23	7.46	1670	1069	195	0.033	17.6	2.6
Noval Factory	1601	Main	0333229 3332516	24	15:45 4/5/2005	22	7.69	620	396.8	135	0	13.2	2.08
House 22 Ter'at El Shaboura St.	1701	Main	0333448 3332521	Unknown	16:10 4/5/2005	23	7.44	890	569.6	235	0	22	2.6
Rashed Assal Smelter	1801	Main	0332383 3332330	Unknown	16:45 4/5/2005	22	7.67	980	627	285	0.033	17.6	1.69
Ismailia Monitoring Well	1901	Main	0333183 3332320	6	16:15 4/6/2005	22	7.63	2030	325	1299.2	0.099	22	2.08
Saad Tomas Monitoring Well	2001	Main		20	10:05 4/6/2005	23	7.51	686	125	439.04	0.165	17.6	2.6
Abu Zaabal Dumpsite	AZ101	Main	N/A	N/A	12:15 4/6/2005	23	8.58	6370	4077	125	0.066	17.6	2.21
Ashour ElSayed Imam House	AZ201	Main	0342591 3350550	9	12:40 4/6/2005	22	7.8	9900	6336	60	0.132	13.2	2.34
	AZ202	Duplicate											
Railway Crossing	AZ301	Main	0342372 3349962	12	12:50 4/6/2005	23	7.23	1100	704	50	0.033	22	1.3
	AZ303	Cross Ref.											
Abu Zaabal Minning Graves	AZ401	Main	0341676 3350029	9	13:55 4/6/2005	21	7.33	600	384	75	0.132	17.6	3.25
A. Mawgood Abu Youssef House	AZ501	Main	0341157 3350559	12	14:10 4/6/2005	23	7.09	3000	192	50	0.099	13.2	2.47
Ibrahim Abu Youssef Farm	AZ601	Main	0341233 3352411	Unknown	14:30 4/6/2005	24	7.05	1300	832	25	0.033	22	1.82
Infront Armenian Entrance	IW0101	Surface water	200m U.S	N/A	17:40 4/5/2005	20	7.77	300	192	200	0.066	17.6	2.21
	IW0103	**Cross Ref.**											
	IS0101	Sediment		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Infront of Ismailia	IS0201	Sediment	Awadalla-2	N/A	17:15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Monitoring Well					4/5/2005								
Infront of Egyptian Welding Academy	IW0201	Surface water	200m D.S	N/A	18:15	21	8.35	300	192	65	0.132	22	2.21
	IS0301	Sediment		N/A	4/5/2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 2: Groundwater Samples Analysis Results at Shoubra El Kheima

SN	Location	GPS		Sample Number	Lead (Pb) ppm
		X	Y		
1	Store at end of El Kamal Street	0332115	3332316	001	< 0.01
2	Beside Seoudi	0332471	3332264	101	< 0.01
3	Awadalla Smelter	0332381	3332262	201	< 0.01
4	El Elm wa El Iman School (under construction	0332307	3332258	301	< 0.01
5	Scrap Store – Mokhles Anwar	0332605	3332291	401	< 0.01
6	Mobil Fuel Station	0333029	3332339	501	< 0.01
7	Iron Smelter – Essam Abdel Hamid	0333176	3332411	601	< 0.0207
8	Iron Smelter – Saad Thomas	0333258	3332439	701	< 0.01
9	El Fottouh Cotton Factory	0333256	3332386	801	< 0.01
10	Misr for Concrete	0333810	3332609	901	< 0.01
11	El Ekhwa for Plastic	0334053	3332759	1001	< 0.01
12	El Masria for Tanks	0334468	3332578	1101	< 0.01
13	Abdel Gabbar Dyeing Company	0332916	3332954	1201	< 0.01
14	Honey Factory	0332858	3332726	1301	<0.0179
15	Tiba Dyeing Company	0332791	3332946	1401	< 0.01
16	Metal Forming Workshop	0333179	3332808	1501	< 0.01

17	Noval Factory	0333229	3332516	1601	< 0.01
18	House 22 Ter'at El Shaboura Street	0333448	3332521	1701	< 0.01
19	Rashed Assal Smelter	0332383	3332330	1801	< 0.01
20	Ter'at El Ismailia Monitoring Well (Willow)	0333183	3332320	1901	0.2089
21	Saad Thomas Monitoring Well (Deep)	0333258	3332439	2001	0.0178

Table 3: Groundwater Samples Analysis Results at the Abu Zaabal Disposal Site

SN	Location	GPS		Sample Number	Lead (Pb) ppm
		X	Y		
1	Abu Zaabal Disposal Site (from a pit)	N/A	N/A	AZ101	< 0.01
2	Ashour El Sayed Emam House	0342591	3350550	AZ201	< 0.01
3	Railway Crossing	0342372	3349962	AZ301	< 0.01
4	Abu Zaabal Mining Graves	0341676	3350029	AZ401	< 0.01
5	Abdel Mawgood Abu Youssef House	0341157	3350559	AZ501	< 0.01
6	Ibrahim Abu Youssef Farm	0341233	3352411	AZ601	< 0.01

Table 4: Surface Water Samples from the Ismailia Canal

SN	Location	GPS		Sample Number	Lead (Pb) ppm
		X	Y		
1	Infront of Armenian Entrance	N/A	N/A	IW0101	< 0.01
2	Infront of Egyptian Welding Academy	N/A	N/A	IW0201	0.0193

Table 5: Sediment Samples from the Ismailia Canal

SN	Location	GPS		Sample Number	Lead (Pb) ppm
		X	Y		
1	Infront of Armenian Entrance	N/A	N/A	IS0101	4.523
2	Infront of Ismailia Monitoring Well	N/A	N/A	IS0201	233.689
3	Infront of Egyptian Welding Academy	N/A	N/A	IS0301	19.195

APPENDIX D

LIST OF PARTICIPANTS AT THE SCOPING SESSION

Name	Position	Organization	Mobile
GOQ			
H.E./Adly Hussein, GOQ			
Raafat Fathy Abd El-Latif	Manager of Environmental Office	Environmental Office	
Mahmoud Hassan Osman	Manager of Security Department	Security Department	
Ali Abd El-Rahman			127061786
EEAA			
Dr. Fatma Abou Shouk	Head of Environmental Management Sector		012 214 4830
Dr. Adel El Shafei	Head of Hazardous Waste Department		010 558 2275
Dr. Ahlam Farouk	Head of Inspection		
Dr. Ahmed Abou El Seoud	Head of Air Quality		0123102068
Eng. Hanan El Hadary	Head of Industrial Unit (EPAP)		010 124 0814
Islam Mohamed			012 370 0022
Atef Yaccoub		Environmental Inspection Department	
Eng. Mona Habib		Greater Cairo Branch	
Dr. Elham Refaat	Head of Hazardous Substances Department		
Dr. Sabry Abdel Menem		Environmental Health Department	
Eng. Safwat Aly Kashaba	Head of Environmental Inspectors		123320920
Hussien Moawad Mahmoud	Cairo Regional Branch Office (RBO)		106157698
Eklaas Gamal El-Din	Manager of Water Quality		105666208
Sayed Mohamed Abd Rabuh	Chemist		
Hany Mohammed Nabil	Environmental Researcher		
Mahmoud Medhat Allam	Central Office for Environmental Impact Assessment		122723635
Ministry of Education			
Mansour El Husseiny	General Manager of Education Department Shoubra El Kheima	Education Directorate	0121624277
Galal Hamed M. Khaled	Head of Primary Education Department	Education Directorate	0106595230
Atef Abd El-Mohsen Shahin	Researcher in the Instiute of Studies and Environmental Researches	Education Directorate	106329400
Ahmed Samy Mohammed	Manager of the Educational Buildings Authorities		123407801
Smelters Owners			

Name	Position	Organization	Mobile
Bahgat Abd El-Fattah		Awadallah Secondary Lead Smelter	
Edward Zaki	Awadallah Secondary Lead Smelter Manager	Awadallah Secondary Lead Smelter	101179034
Emad Ismail Seoudi	Manager	Seoudi Secondary Lead Smelter - El-Amal Factory	123245624
Ali Kassem	Lawyer	El-Mahy	
Shoubra El Kheima - East District			
Mervat Hassan	EU Manager		0121091884
Saadeya Ragab Abd Allah	Information Center Manager		
Albair El-Baialy			
Mousrafa Ali Hassan		Environmental Office	
Ibrahim Ahemd El-Sayed		Environmental Office	
Parliament			
Mohammed Oda		People Assembly - Parliament	
Mr. Farouk el-Deeb		People Assembly - Parliament	
Dr. Mahdy Asr		Shoura Council member	
Lawyers			
Amin Sayed Amin			127714959
Ehab Abd El-Monaem			101775312
Shobra El Kheima City			
Mohammed Ahmed Mohammed			
Mohammed Abd El-Hafez	Factory Owner		122143616
Fouad El-Diamry			122912378
Somaya Mohammed	Public Relations		
Sayed Ahmed Sayed	Head of Local Council	Local Council	
Essam El-Din Zaki Hamed	Manager of the Environment Office	Environment Office	
Mohammed El-Gool	Member of the Local Council	Local Council	124918690
Mourad Ghaly	Member of the Local Council	Local Council	127295937
Ahmed Hussien El-Badawy	Member of the Local Council	Local Council	101787238
Mohammed El-Haag	Head of the Local People Council	Local People Council	
Adel Ibrahim Ayad	Member of the Local Council	Local Council	127441732
Mona Mohammed Hafez			101764329
Salah Sayed Imam	Member of Shuobra El-Kheima Association		
Ali Mohammed Kassim		Public Relations	
Shoubra El Kheima-West District			
Mohammed Samy Helmy	Head of the Local People Council - West District		

Name	Position	Organization	Mobile
Mohammed Ahmed	Manager of Environmental Affairs		
Iman Hassan Abd El-Wahhab	Environmental Researcher		
Media			
Khadiga Hanfy Maddkor	Jouranlist	El-Gesser El-Arabi Journal	121821746
Magdy Mohammed	Chief in Editor	El-Gesser El-Arabi Journal	127064405
Schools			
Laila Mohammed Mohammed	Ahmed Shaalan School Manager		
Samya Abd El-Wahed Elneshooky	Ibn Kaldoon School Manager		123274464
Academic Institutions			
Dr. Hosny Ibrahim Mohammed	Assistant Professor- Faculty of Science, Cairo University		105356987
Mr. Ahmed Farouk	Teaching Assistant- Faculty of Science, Cairo University		105160284
Dr. Samir Abd El-Baky Zain	Head of Environmental Engineering Department	Helwan University	
Dr. Zainab Safar	Head of Mechanical Engineering Department	Cairo University	
Consultants			
Yossry Ibrahim Youssef	Engineer		
Libraries			
Amr Abd El-Salam	Manager	Shoubra El-Keima Library	101471980
Religion			
Younan Rizk	Priest	Mar Girgus Church	124598709
Ali Mohammed	Shaikh	Awkaf of Shuobra El-Kheima	123615611
Health Sector			
Nwaheeb Farahat	Head of Protective Division	Health Sector of Shuobra El-Kheima	101979360
Others			
Sanaa Saaed Abd El-Mohsen	Manager of the Nile and Media Institute	The Nile and Media Institute	
Ali Ali Hussien			
LIFE-Lead Project			
Kirk Ellis	Chief of Party	Life Lead	
Amr Ismail	Site Engineer	Life Lead	
Bahy Emam	Site Engineer	Life Lead	
Dina Alaa	Training & Communication Assistant	Life Lead	
Fatheya Soliman	Technical Design Manager	Life Lead	
Heba El-Toudy	Training Specialist	Life Lead	
Heba Wafa	Health Risk Assessment	Life Lead	

Name	Position	Organization	Mobile
	Specialist		
Jim Baker	MSE	Life Lead	
John Christenson	MSE	Life Lead	
John Mackey	MSE	Life Lead	
Khaled Fahmy	Deputy Chief of Party	Life Lead	
Lane Krahl	Consultant	Life Lead	
Madiha Afifi	Training & Communication Manager	Life Lead	
Magued Youssef	Technical Planning Manager	Life Lead	
Salwa Tobbala	Communication Specialist	Life Lead	
Environics			
Dr. Ali Nasser	Environmental Assessment Expert		101417105
Dr. Magued Hamed	Risk Assessment		17340619
Eng. Dalia Nakhla	Environmental Assessment Specialist		
Eng. Abeer Shokayer	Contaminated Sites Remediation Specialist		103300346
USAID			
Ron Danial	Special Project Officer		
Seif Allah Hassanin	Environment Office		
Amany Gamal El-Din	Project Supervisor		
Mohammed Abd El-Rahman	Projects Engineer		

APPENDIX E

DETAILED SUMMARY OF COMMENTS AND SCOPING RESPONSES FROM THE SCOPING SESSION

Introduction

The LIFE-Lead Pollution Clean-Up in Qalyoubia Scoping Session was held on Wednesday Febraury 2, 2005 at the Shoubra El-Kheima City Council Hall. The session was attended by approximately 90 participants from local government, executive agencies, and community representatives in addition to the project team. The following is a summary of comments either made by the participants during the session or submitted in writing during or within one week after the session in response to a scoping response form distributed at the beginning of the session.

Summary of Comments Made during the Session[2]

Atef Shaheen
Post-graduate Student, Institute of Environmental Studies, Ain Shams University and a Local Resident.

Mr. Shaheen stressed that the social aspects should be covered in parallel with the environmental impact e.g. to include impacts on workers of the smelters that are no longer operating. Also there was an inquiry about the activities under each component of the project and which ones have already been accomplished. It was not clear in the handout.

In addition, Mr. Shaheen had concerns about the impacts of the project activities and the processes following remediation since it is a pilot project. The other concern was of the children already impacted from the high lead levels and how they would be treated to reduce the concentration in their blood.

This final concern was the scope of the project since it involves only the smelters, while there are other sources of lead pollution in the neighborhood

Zeinab Safar and Khaled Fahmy

In response for the item related to children and residents, Dr. Safar clarified that blood samples were taken and the National Council for Women is planning to take health measures through nutrition and medical treatment for example to try to reduce lead levels in the blood.

In response, Dr. Fahmy clarified regarding the social assessment, the social component of the project will address this issue.

Ekhlas Gamal El Din
General Manager Water Quality Unit , EEAA

Ms. Gamal El Din commented on the remediation already performed by Awadallah and whether is has been done properly or would further remediation actions need to be done by the project to his smelters.

[2] Recorded in sequence of speaking during the session

Khaled Fahmy

In response Awadallah status, there will be an agreement with EEAA that there will not be inspected or fined for the period of remediation.

Ahmed Abu El Soud, EEAA

Eng. Abu El Soud said that regarding clean-up done by Awadallah, the sites will be assessed and if required clean up levels are not reached, the sites will be remediated.

Ahmed Sami Mohamed
General Manager of Education Buildings, Qalyuobia

The agency where Mr. Mohamed works is involved in annual maintenance of schools, therefore Mr. Mohamed expressed an interest in the recommendations that would result from this project regarding school clean-up and remediation. In addition, it would be beneficial if the project resulted in guidelines that can be utilized and distributed to maintenance contractors.

Mr. Mohamed asked why was only "Ahmed Shalaan" school included in the project and whether this implies that it suffers from the highest pollution compared to other schools. In addition, an inquiry on the role that the Education Buildings (his agency) would have in this project was raised.

Zeinab Safar

In response, Dr. Safar also added that "Ahmed Shalaan" school was selected since it had the highest pollution and it will be a pilot to demonstrate how NGOs and Education Buildings could repeat clean-up activities in schools of similar conditions.

Fatheya Soliman

Responding, Dr. Soliman said that the Agency for Education Building will be invited to the training that will be given to contractors by Life-Lead they are responsible for cleaning-up schools of similar conditions.

Bahgat Abdel Fatah
Lead Smelter Manager (Awadallah)

Although Mr. Abdel Fatah took the initiative of cleaning, EEAA are giving him fines (مخالفات) for his smelter and vehicles on the road (اشغال طريق). .

Mr Abdel Fatah also stated that this area is industrial and sensitive establishments such as schools were misplaced or located without planning within the smelters' area and not vice versa. Therefore this should be taken into consideration in Abu Zaabal industrial estate to ensure that it is planned properly and no sensitive establishments (schools) would be improperly located.

Mr Abdel Fatah was also concerned with the need to move to Abu Zaabal and not allowed to stay in Shoubra El Kheima and upgrade their technology to a cleaner one.

Amr Mohamed Abdel Salam
Library Manager Shoubra El Kheima, NGO-Integrated Care Society

Mr. Abdel Salam asked why weren't they involved in such project especially that they are an active NGO in the area and pointed out that NGOs should be involved in "awareness" campaigns and the implementation.

Zeinab Safar and Khaled Fahmy

In response, Dr. Zeinab pointed out that NGOs will play a major role in this project. While one NGO is already involved, other agencies that are also in the project are the Governorate, EEAA, Education Directivity and Dr. Wafia Eteba (from Ministry of Health and Integrated Care Society).

Ali Kasem
El Mahy Smelter

Mr. Kasem stated that the objective of the project is to combat pollution and have clean air. He has several requirements:

- Allocating an alternative piece of land in Abu Zaabal area.
- Assistance in using the current land for a suitable project.
- Assistance with the situation of Abu Zaabal land payment. El-Mahy smelter owners have paid a down payment for the new land, but were not able to make the rest of the installments on time and now have trouble in paying the interests.

Khaled Fahmy

Now, Mr. Ali is cooperating and has reserved land in Abu Zaabal but could not pay in time and has accumulated high interest on his money, which he is unable to pay.
In response, the Life project have already spoken to the Governor and El Mahy will be excused from paying the accumulated interest on the price of land but El Mahy is expected to pay for the land in Abu Zaabal as soon as possible.

Morad Ghali
Local Council, Shoubra El Kheima

Mr. Ghali asked whether all concerned agencies are involved in project implementation such as: Education Buildings, Ministry of Industry., Ministry of Heath , Local council and Ministry of Environment

Khaled Fahmy

Responding, Dr. Fahmy said that the LIFE-Lead project will perform the technical component in clan-up but other important stakeholders will continue working in this area to assure sustainability.

Ahmed Farouk
Faculty of Science, Cairo University.

Mr. Farouk pointed out that the project area is one of earthquakes and has a number of willow tectonics which may result in fractures. This should be considered or included as a criterion for alternative selection especially during soil removal/excavation. Excavation may lead to fractures opening and lead transfer to the groundwater and eventually to the Ismailia Canal.

Ali Hassan
EIA Expert

In response, Dr. Hassan commented that the geological setting of the area will be included as part of the baseline environmental conditions of the EIA and that the concern of Mr. Farouk will be taken into consideration.

Ahlam Farouk
Head of Inspection Unit, EEAA

Ms. Farouk asked where would the contaminated soil go to. Abu Zaabal landfill is a sanitary one and is not prepared to accommodate hazardous waste. Also, Ms. Farouk recommended solidification of the soil before land filling.

In addition, Ms. Farouk was concerned with the handling and management of the glass removed from El-Shahid Ahmed Shalaan school windows. What about ensuring Personal Protective Equipment (PPEs) during the operations?

Fatheya Soliman

Dr. Soliman responded that health and safety regulations and requirements will be followed during remediation activities and will be included as part of the training to the clean-up contractors. As for land filling, leaching test will be performed to the soil in all forms before it is landfilled to ensure that it is in a form that results in no leaching.

Elham Refaat
Head of Hazardous Waste Unit, EEAA

Ms. Refaat asked if there are other sources of lead contamination in the project area and whether they represent a pollution load. In addition, Ms. Refaat recommended that the "secure landfill" of Nasereya, Alexandria could be used by the project since Abu Zaabal is not suitable.

Safwat Khashaba
Inspection Unit, EEAA

Mr. Khashaba ensured the recommendation made by Ms. Refaat on the use of Naseerya landfill.

Ahmed Abu El Soud,
EEAA

Dr. Abu El Soud responded that the choice of landfill depends on economical factors as well as environmental and technical factors. However, the length of journey is important to minimize risk of transportation. Finally Dr. Abu El Soud added that the smelter owners

should sign an agreement with the Governorate on the intended future use of the smelter site in Shoubra El-Kheima, since this will determine the level of remediation.

Summary of Comments Submitted in Writing (during and within one week of the session)[3]

Ali Kasem
El Mahy Smelter

Mr. Kasem comments dealt with the nature of the remediation process. He requested that the remediation process takes place without causing any causality and with complete protection to the health of the various people working in the remediation. He wanted to know how the remediation will be carried; is it by removing soil from the site, or by covering it with a suitable liner? He wants the contamination problem to be solved within the available techniques and resources either through the smelter itself or through the project. One final comment was the he wants the governorate to help them in getting the land for re-establishing the smelter in Abu Zaabal Industrial Area.

Eng. Safwat Khashaba
Environmental Inspection, EEAA

Eng. Khashba mentioned again that El-Naseryia landfill could be an efficient place to receive the hazardous wastes driven from the sites. This landfill could receive inorganic hazardous wastes (as in our case) and the cost of one ton is approximately 338 L.E. This landfill is located at 11 Mahmoud Kattab Street-Alexandria. He also gave us his mobile phone number and the phone numbers of the landfill. He appreciated the work to be done by the project as it is a pioneer in the area. He wanted all the results to be documented especially the side effects so that it be handled in future projects. He wanted a bigger and a more effective role for the media sector, especially the media targeting the youth. He wanted the people to know that EEAA is not just a place to collect fines as known by the various factory owners, but it is a place to protect the labor working in these factories besides protecting all the people of this country. He wondered what the situation in the hospitals and various medical centers is, because if no environmental precautions are implemented there then they will be a contamination source.

Mrs. Fayza Ragab Mohammed Aly (was not present at the meeting)
Education Directorate, Shoubra El-Kheima

Mrs. Ragab had many comments which could be summarized in the following:

1. Nothing was mentioned on the pupils of Ahmed Shaalan School who have graduated and left the school,
2. Residents should have known earlier about the problem through mosques, cafes, and churches,
3. Are maps available for the complete infrastructure in the area to ensure that no contradictions occur between the activities of the project and the existing facilities,
4. Were all the criteria for selecting among the remediation activities well studied, and
5. A list containing the remediation alternatives should be presented on the concerned parties in another session. This should be accompanied by a media campaign to help the people form a positive attitude on the activities.

[3] Received until Tuesday February 8, 2005.

She mentioned that the Environmental and Population Sector in the East Shoubra El-Kheima Educational District could initiate an awareness campaign among the residents of the area. This will help in clearly showing the positive effects of the projects together with highlighting the drawbacks of living with all the sources of contamination active as the case now.