Public Health Assessment for

FLORIDA STEEL CORPORATION
INDIANTOWN, MARTIN COUNTY, FLORIDA
CERCLIS NO. FLD050432251
SEPTEMBER 10, 1992

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

PUBLIC HEALTH ASSESSMENT

FLORIDA STEEL CORPORATION

INDIANTOWN, MARTIN COUNTY, FLORIDA

CERCLIS NO. FLD050432251

Prepared by:

Florida Department of Health and Rehabilitative Services
Under a cooperative agreement with:
Agency for Toxic Substances and Disease Registry

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SUMMARY

The Florida Steel Corporation site is located approximately 2 miles northwest of Indiantown in Martin County, Florida. Florida Steel Corporation operated a steel mill at this site from 1970 to 1982. The area around this site is sparsely populated swamp and brushland zoned for industrial use. Mill wastes included cooling water contaminated with heavy metals and polychlorinated biphenyls (PCBs) and steel mill by-products (slag, mill scale, and emission control dust) containing heavy metals. Past handling of steel mill wastes resulted in soil and ground-water contamination. PCB-contaminated soils were incinerated on-site in 1988. The resulting ash contains lead and is stored in an on-site building pending final disposal.

On-site soils and sediments are contaminated with lead and PCBs. Shallow ground water is contaminated with lead and radium. The contaminated ground water extends approximately 600 feet south of the site boundary. Off-site sediments have also been contaminated as the result of stormwater run-off from the site.

Potential exposure pathways for on-site workers include inhalation of contaminated dust, incidental ingestion of contaminated soil, and dermal contact with contaminated soil and ground water. A 1984 NIOSH investigation found unacceptably high concentrations of heavy metals in the air during cleanup operations. Until the site is cleaned up, careful attention to safety procedures and respiratory protection should limit worker exposure to contaminated soil and ground water. There are no completed exposure pathways for off-site populations.

There have been few health concerns expressed by people living near this site. No existing water wells are contaminated but county health officials are concerned about future contamination of the deeper drinking water aquifer. There are no worker medical records or community health records to indicate whether or not contaminants from this site have impacted public health. Cancer and birth defect rates for this area are within expected ranges.

This site is a public health hazard. If this site is not remediated, exposures to metals and PCBs in soil and ground water may occur at concentrations that, upon long-term exposure, could cause adverse health effects. Recommendations include on-and off-site soil and ground water remediation, appropriate worker safety precautions during remediation including respiratory protection, and restricted use of the contaminated ground water until it is cleaned up.

The data and information developed in the Florida Steel Corporation Public Health Assessment have been evaluated for appropriate public health actions. The ATSDR Health Activities Recommendations Panel does not recommend any additional health follow-up activities at this time.

BACKGROUND

A. SITE DESCRIPTION AND HISTORY

The Florida Steel Corporation (Florida Steel) site is located on State Road 710, about 2 miles northwest of Indiantown in Martin County, Florida. This 150-acre site is bounded on the northeast by State Highway 710, on the northwest by the Caulkins citrus processing plant, and on the south by a 230,000-volt power line. The area east and west of the site is undeveloped (Figure 1, Appendix). Florida Steel began operating a steel mill at this site in 1970. The mill used an electric arc furnace to melt scrap metal (primarily automobiles) and fabricate steel products such as concrete reinforcing bars. The mill closed in 1982 for economic reasons and there are no plans to reopen it.

Three types of by-products were generated by this mill: (1) mill scale, the oxidized iron that sloughed off the hot steel as it was cooled with water sprays, (2) slag, formed when lime was introduced as a flux into the furnace to remove impurities such as soil and sand, and (3) emission control dust, the fine particulate material generated as the high temperatures of the electric arc furnace drove off iron and other metals in the scrap metal.

Water used to cool the steel making equipment was contaminated with iron oxide, lubricating oils, and hydraulic fluid. Hydraulic fluid contaminated with polychlorinated biphenyls (PCBs) was likely the source of PCBs in the cooling water. The cooling water was collected and piped to a concrete recirculating reservoir where the iron oxide particles and dense oils settled out. Floating oil was removed by an oil skimmer. On-site disposal of the sludge and other mill by-products contaminated soil, sediment, surface water, and ground water.

In December 1982, the U.S. Environmental Protection Agency (EPA) included this site on the first Superfund National Priorities List. In 1983, Florida Steel began the first phase of the remedial investigation under the Florida Department of Environmental Regulation's (DER) oversight. Florida Steel found high concentrations of lead in the emission control dust and in the ground water. In March 1983, Florida Steel discovered that sludge from the bottom of the concrete recirculating reservoir and some soils in the emission control dust area contained PCBs.

Between 1985 and 1987, Florida Steel shipped about 8,000 tons of emission control dust off site to a metal recycling facility. Some emission control dust still remains at the site. Between 1987 and 1988, Florida Steel incinerated about 11,200 cubic yards (18,000 tons) of PCB contaminated soil, sediment and emission control dust. Because of the presence of heavy metals, the resulting incinerator ash was stored in the large mill building on site pending final site cleanup. Florida Steel is conducting a feasibility study to identify cleanup options.

B. SITE VISIT

Connie Garrett of the Florida Department of Health and Rehabilitative Services (HRS) visited the site on December 6, 1990. The site was surrounded by an 8-foot chain-link fence posted with trespassing and hazard warning signs. The large mill building and one smaller building were within the fence. Incinerator ash was stored in the mill building. Part of the mill building was leased by O & H Materials for the maintenance and storage of a mobile PCB incineration unit. Steel mill machinery and other equipment have been moved to other steel mills. West of the mill building was a vault constructed of slag and site soil. This vault held the PCB-contaminated soils and emission control dust prior to incineration. There was also an electric power sub-station on this site. An easement allows Florida Power and Light staff access to this power sub-station. There are two borrow-pits in the southeastern corner of the site. There are also three storage tanks on the site. An office building and an area leased for storage of metal cable spools was outside the fence, northeast of the site (Figure 2, Appendix).

Florida Steel Corporation employees and Florida Power and Light staff are the only persons currently allowed access to the site. At the time of the site visit there was no evidence of unauthorized site access. Authorized workers are aware of the on-site physical hazards.

C. DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCE USE

The Florida Steel site and land to the east, south, and west are zoned for industrial use. The area north of the site is zoned and used for agriculture. The citrus processing plant northwest of the site, State Road 710, the CSX Railroad, and the 230,000-volt electric transmission line are the only developments within 1 mile of the site. The land in the vicinity of the site that is not developed is mostly brush and swamps.

There about 12 houses 0.5 mile south of the site along West Farm Road. These houses are in the path of ground-water flow from the site. There are 5 other houses within 0.5 mile north and east of the site. Indiantown, a community of about 5,000 persons, is about 1.5 miles southeast of the site. The Indiantown subdivision nearest to the site has about 165 single family homes (Figure 3, Appendix). During the site visit, this subdivision was observed to be predominately lower middle income hispanic with young or adolescent children. A minority of retirement age whites were also observed.

Florida Power and Light plans to build and operate a 500,000-volt electric transmission line along a north-south easement on the western portion of the site. Indiantown Cogeneration L.P. is planning to buy the western half (75 acres) of the Florida Steel site and land south and southwest of the site. They plan to build a 300 million watt coal-fired electrical steam cogeneration power plant on this land by 1994.

Florida Steel has recorded in the land title records of Martin County, Florida, a declaration of restrictive covenants which preclude the use of this site for residential or recreational purposes (Morris, 1990). Those restrictions are enforceable by all interested parties including EPA and DER and can only be changed by court order. The restrictions prohibit:

1) Use of the property for residential purposes;

2) Operation of day-care facilities, kindergartens, playgrounds, schools or other facilities on the property catering to children under the age of sixteen years;

3) Use of the property for swimming, fishing, camping, or hunting;

4) Construction or operation of structures or improvements intended for use for recreational purposes on the property; and

5) Use of the property for the purpose of growing crops to provide food for humans or animals.

D. STATE AND LOCAL HEALTH DATA

In 1984, the National Institute of Occupational Health and Safety (NIOSH) investigated a complaint made by the International Union Department of the United Steel Workers of America. This complaint alleged that former steel workers were exposed to heavy metals, PCBs, and radioactivity at this site. NIOSH visited Florida Steel on May 15 and 16, 1984, to observe removal of emission control dust and collection of soil samples for PCBs analyses. NIOSH collected personnel air samples, ambient air samples, and wipe samples to evaluate PCBs and heavy metals exposures. Two of the monitored workers were employees of the contractor responsible for removing emission control dust from the site. The other two monitored workers, a fabricator/welder and a maintenance man were employed by Florida Steel. Personal breathing zone air samples were collected on filter cassettes attached to the workers' shirt collars. Airborne dust was trapped on the filters by pulling known volumes of air through the filters with battery-powered air sampling pumps attached to the workers' belts (Salisbury, 1987).

In 1991, HRS epidemiologists reviewed the state birth defect and cancer registry data bases for the 34956 zip code which includes Florida Steel and Indiantown. In 1980 the population in this zip code was approximately 5,000, although less than 10 people live within 0.5 mile of the site. The birth defect data base covers birth defects reported from 1980 through 1982 and the cancer data base covers cancers reported from 1981 through 1987.

Results of these investigations are discussed in the Public Health Implications, Health Outcome Data Evaluation section of this document.

COMMUNITY HEALTH CONCERNS

Past employees have expressed concern about occupational exposures, and the appropriate federal agencies addressed those issues. The site is relatively isolated with few people living near the site. Only authorized personnel have access to the site, and those people are aware of site conditions. Therefore, the state and local health agencies do not have current health concerns for those people who live near the site. Should ground-water contamination enter any private wells, which is unlikely, near the site, community health concerns will be reevaluated.

Few health concerns have been expressed by people living near this site. During the public comment period between January 14 and February 28, 1992, Florida HRS did not receive any inquiries or comments.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

To identify facilities that could contribute to the air and ground-water contamination near the Florida Steel site, Florida HRS Toxicology and Hazard Assessment personnel searched the 1987, 1988, and 1989 Toxic Chemical Release Inventory (TRI) data bases. TRI was developed by the U.S. Environmental Protection Agency (EPA) from the chemical release (air, water, soil) information provided by certain industries. The TRI data bases were searched for the 34956 zip code which includes Florida Steel and most of Indiantown. The only facility in that zip code reporting releases was the IMC Fertilizer, Inc., plant located on S.R. 710 southeast of the site. IMC Fertilizer reported releases of manganese, copper, and zinc. The concentrations of these metals at Florida Steel were below levels of health concern.

A. ON-SITE AND OFF-SITE CONTAMINATION

PCB sampling and cleanup preceded the two-phased Remedial Investigation. The initial PCB assessment occurred during 1983 and 1984, involved more than 1,400 soil and sediment samples, and defined areas from which soil was evacuated and incinerated, as described in the Site Description and History section (ATSDR, 1988A, 1988B).

The intent of the first phase of the Remedial Investigation was to identify all contaminants of concern remaining at the site. During Phase I, sampling was done in those areas with the highest potential for contamination including: the perimeter of the former PCB excavation area, the large former emission control dust disposal area south of the mill, and the former scrap processing area (Ardaman & Associates, 1988C). These samples were analyzed for all organic and inorganic constituents on the Hazardous Substance List.

The Consent Agreement of September 1985 between the DER and Florida Steel Corporation provided for semi-annual sampling for Hazard Substance List parameters in soil, ground water and surface water. Ground water is only analyzed annually for PCBs since they have never been detected in the monitoring wells.

Florida Steel Corporation contractors collected additional soil, sediment, and surface water samples from various locations across the site during Phase II (Ardaman & Associates, 1989). Phase II samples were analyzed for lead, barium, and PCBs only. For the Remedial Investigation, 206 on-site soil and sediment samples, 13 off-site sediment samples, 220 on- and off-site ground-water samples, and 8 off-site surface water samples were collected. Air sampling was done on two occasions for Phase I of the Remedial Investigation and for two days as part of the earlier NIOSH site investigation.

The highest concentrations of heavy metals in soils were found in the emission control dust disposal areas west and south of the mill building, and around the bag houses south of the mill building (Figure 4, Appendix). Elevated levels of metals were also found along the north-south road east of the mill building and between the railroad tracks west of the large emission control dust disposal area. The highest concentration of lead in the sediments was detected in the on-site drainage ditch along the southern property line. Lead concentrations were also elevated in drainage ditch sediments south and east of the site. The sediment samples from the drainage ditch adjacent to West Farm Road contained 5 parts per million lead. This level is four times greater than the lead levels detected in background samples and exceeds the five year Environmental Media Evaluation Guide level for children of 1 part per million (ATSDR, 1990). Sediment lead concentrations, however, decreased rapidly downstream of the site. Lead was below detection limits in a sediment sample taken from the ditch near the St. Lucie Canal.

In February 1990, Florida Steel contractors collected several sediment samples from on-site and off-site locations to further evaluate the potential for contaminants to migrate from the site. Contaminants of concern and their maximum concentrations determined as a result of the sampling done during Phases I and II of the Remedial Investigation and this February 1990 sampling effort follow (Bryant, 1990).

Contaminants have not currently been detected in monitoring wells at depths greater than 50 feet. Downward movement of the contaminated ground water may be restricted by the low vertical hydraulic gradient. The levels in the following tables reflect current site conditions. The samples were collected for the October 1989 Phase II Remedial Investigation Report.

In June 1987, the Florida HRS Martin County Public Health Unit analyzed samples from the 2 nearest private drinking water wells. These two wells are located approximately 0.5 mile south of the site (hydraulically downgradient) and are reported to be 104 and over 100 feet deep, respectively. The water quality in these 2 wells was acceptable for potable use. The concentrations of chloride, iron, lead, sodium, total dissolved solids, and gross alpha were at background levels.

Testing for airborne particulates, specifically heavy metals in emission control dust, was performed twice during the Phase I investigation by Florida Steel contractors. Air samples were collected during wind conditions that varied from calm to very strong from tripod mounted, portable high-volume sampling equipment downwind of the emission control dust disposal area. Lead emissions were well below recommended limits of the Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH). The discrepancies between the levels detected by NIOSH staff and Florida Steel Contractors, Ardaman & Associates (1988C), probably relate to the different methods of sample collection. The NIOSH sampling involved actual personal airspace samples of workers who were shoveling emission control dust while the Ardaman & Associates sampling involved air sampling when the emission control dust was not being disturbed.

1. On-Site Contamination.

The source for the data in the following tables is the Ardaman & Associates 1989 Remedial Investigation--Phase II.

Table 1. On-Site Ground-Water Concentration Ranges.

Contaminants	Shallow 2.7-19.5 ft	Intermediate 19.5- 46 ft	Deep 111-126 ft	Comparison Values
Lead (ug/L)	ND - 742	ND - 217	ND	50 ug/l[1]
Gross Alpha (pCi/L)	ND - 66	ND - 202	ND	15 pC/L[1]
Radium (pCi/L)	ND - 21.5	ND - 110.0	NA	5 pCi/L[1]
PCBs (ug/L)	NA	NA	NA	0.05 ug/L[2]

ug/L - micrograms per liter
pCi/L - picocuries per liter
[1] - Maximum Contaminant Level
ND - not detected
NA - not analyzed
[2] - Environmental Media Evaluation Guide (child, chronic)

Table 2. On-Site Soil Concentration Ranges.

Contaminants	Range of Soil Concentrations (mg/kg)	Comparison Value (mg/kg)
Lead	ND - 150,000	Not Available
Gross Alpha	NA	Not Available
Radium	NA	Not Available
PCBs	ND* - 1,136[a]	3.5[1]

mg/kg - milligrams per kilogram
ND - not detected
NA - not analyzed
*PCB samples had variable detection limits
[a] - One February 1990 sample had 1,136 mg/kg. <20% of the Phase- II samples had >15 mg/kg.
[1] - Environmental Media Evaluation Guide (adult ingestion--a child is not expected to be on this site)

Table 3. On-Site Air Concentration Ranges.

Contaminants	Range of Air Concentrations (mg/M^3)	Comparison Value (mg/M^3)
Lead	0.006 - 0.779	0.05[1]
Gross Alpha	NA	Not Available
Radium	NA	Not Available
PCBs	0.8 - 2.1	1[1]

mg/M^3 - milligrams per cubic meter
NA - not analyzed
[1] - OSHA Time Weighted Average exposure limit (occupational exposure)

2. Off-Site Contamination.

Table 4. Off-site Ground-Water Concentration Ranges.

Contaminants	Shallow 2.7-19.5 ft	Intermediate 19.5-46 ft	Deep 111-126 ft	Comparison Values
Lead (ug/L)	NA	ND - 214	NA	50 ug/l[1]
Gross Alpha (pCi/L)	NA	ND - 107	NA	15 pCi/L[1]
Radium (pCi/L)	NA	ND - 48.2	NA	5 pCi/L[1]
PCBs (ug/L)	NA	NA	NA	0.05 ug/L[2]

ug/L - micrograms per liter
pCi/L - picocuries per liter
NA - not analyzed
ND - not detected
[1] - Maximum Contaminant Level
[2] - Environmental Media Evaluation Guide (child, chronic)

Table 5. Off-Site Sediment Concentration Ranges (mg/kg).

Contaminant	Range of Sediment Concentrations (mg/kg)	Comparison Values (mg/kg)
Lead	23 - 657	Not Available
Gross Alpha	ND	Not Available
Radium	ND	Not Available
PCBs	ND	0.25[1]

mg/kg = milligrams per kilogram
ND = Not Detected.
[1] - Environmental Media Evaluation Guide (child ingestion--a child may play in off-site sediments)

B. QUALITY ASSURANCE AND QUALITY CONTROL

The data collected for Phases I and II of the Remedial Investigation are judged to be valid assuming sampling conformed with the work plans and approved Quality Assurance Project Plans (QAPPs) (Ardaman & Associates, 1988A, 1988B). In addition, representatives from the Region IV EPA and the DER were present on the first days of sampling for Phase II of the Remedial Investigation to observe sample collection protocol and obtain split samples. Split samples showed adequate agreement. It is assumed adequate quality assurance and quality control measures were followed in preparation of the Remedial Investigation documents with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analysis and conclusions drawn for this public health assessment are dependent upon the completeness and reliability of the referenced information.

C. PHYSICAL AND OTHER HAZARDS

Site access is restricted, and persons with site access are aware of the vault, borrow pits, and disassembled equipment that may present a physical hazard.

PATHWAYS ANALYSES

A. ENVIRONMENTAL PATHWAYS (FATE AND TRANSPORT)

Source of Contamination: Steel mill waste such as slag, emission control dust, incinerator ash, and leaking hydraulic fluid were the sources of contamination at this site.

Environmental Media and Transport: Leaching and run-off from the slag, emission control dust, incinerator ash, and leaking hydraulic fluid has resulted in soil, surface water, and ground-water contamination. Potential pathways for movement of contaminants include airborne dust, surface water run-off, and ground-water flow.

Air: Personal air monitoring during the NIOSH investigation indicated that emission control dust removal workers without respiratory protection were exposed to unacceptable levels of heavy metals via inhalation. However, static air monitoring during Phase I of the Remedial Investigation (Ardaman & Associates, 1988C) failed to detect airborne contaminated dust. This sampling, however, was not conducted at the time of emission control dust remediation. Therefore, contaminated soil is likely to be transported via airborne dust during soil and emission control dust remediation.

Ground Water: Ground-water contamination is confined to the upper portion of the surficial aquifer (3-47 feet deep). The surficial aquifer is the principal source of potable water in Martin County (Lichtler, 1960; Ardaman & Associates, 1989). Contaminants have not been detected in monitoring wells deeper than 50 feet, while water producing zones (for domestic use) are generally at depths of 100 feet or greater. The shallow aquifer is composed principally of sand but contains relatively thin beds and lenses of limestone, sandstone and shell, which are generally more permeable than the sand (Lichtler, 1960). Downward movement of the contaminated ground water may be restricted by a lower permeability in the underlying silty sediments, and by the low vertical hydraulic gradient (Lichtler, 1960; Ardaman & Associates, 1989). Contaminated ground water extends about 600 feet south of the site boundary.

There are no indications that the source of radium and, subsequently, elevated gross alpha levels measured in the contaminated ground water originated directly from the steel mill emissions. Rather, the occurrence of high levels of radium and gross alpha in the ground water may be attributed to site activities which increased the leaching of natural radium from the soil or concentrated the naturally occurring radium. Ground water used in the non-contact cooling system was softened by cation exchange to prevent scaling in the cooling water lines. A sodium chloride solution was flushed through the softener to regenerate the cation exchange medium, and the resulting brine was discharged onto the ground in the vicinity of the softener. Leaching tests with a sodium chloride solution performed on native soil, emission control dust, lime, and slag indicated dissolved sodium chloride caused naturally occurring radium to leach from the soil (Ardaman & Associates, 1989). Naturally occurring radium in the ground water withdrawn by the production well may have also been concentrated by cation exchange in the column resin as a result of the water softening process (Ardaman & Associates, 1989).

Lead and radium levels are elevated in the contaminated ground water. While the sources are not known, a combination of leaching from contaminated soils and cation exchange (USEPA, 1990), such as the process discussed above, is possible with naturally occurring and introduced metals.

Surface Water: The concentrations of contaminants in on- and off-site surface water bodies are below levels of concern. None of the contaminant levels in the on-site surface water or the nearby St. Lucie Canal (into which this surface drainage empties) exceed the Ambient Water Quality Criteria for the Protection of Human Health (USEPA, 1986). These criteria include levels adjusted for the consumption of aquatic organisms and drinking water. These levels do not exceed the ATSDR Environmental Media Evaluation Guidelines (EMEGs).

B. HUMAN EXPOSURE PATHWAYS

Currently, exposure is restricted to on-site workers. The nearest residents, 0.5 mile south of the site, have not been exposed through their drinking water or other environmental media. It is not believed that the nearby citrus fields or citrus processing plant have been affected.

Soil: Principal on-site routes of exposure to heavy metals and PCB-contaminated soil are incidental ingestion, inhalation of entrained particles, and dermal contact. None of the workers currently allowed on the site are involved in direct contact with the soil. Unprotected remediation workers, however, may be exposed. Careful attention to safety procedures and use of effective respiratory protection is necessary in the future to limit worker exposure to contaminated airborne dust and soil.

Exposure to contaminated sediments off site is unlikely. Surface water run-off from this site is intermittent and sediments in these drainage ways are frequently dry. Inhalation of contaminated dust from these sediments is unlikely except during excavation. Dermal exposure to these sediments is also unlikely since they are in a heavily-vegetated inaccessible area south of the site.

Air: Occupational exposure via inhalation of contaminated dust at levels of concern may have occurred in the past. Although air monitoring by Ardaman & Associates (1988C) did not reveal airborne contaminants at levels that exceeded OSHA recommendations, the air sampling carried out by NIOSH (Salisbury, 1984) indicated that remediation workers involved in the transportation of emission control dust were exposed to unacceptable levels of lead. Unless effective protective equipment is used, future remediation workers are likely to be exposed (via inhalation) to unacceptable levels of airborne contaminated dust.

Ground Water: Currently there are no completed human exposure pathways to the contaminated ground water. There is, however, the potential for human exposure if the contaminated ground water is not remediated. At its present rate of movement, the contaminated ground water is expected to reach the nearest residential well in about 35 years. Figure 3 and Table 4 in the Appendix contain well locations, well owners, and well depths. If these wells become contaminated, ingestion would be the primary route of exposure.

Surface Water: The concentrations of contaminants in on- and off-site surface waters are below levels of concern.

PUBLIC HEALTH IMPLICATIONS

A. TOXICOLOGICAL EVALUATION

Health risks were assessed for on-site workers and to the general population off site. Contaminants of concern include lead, gross-alpha, radium, and PCBs.

Long-term human exposure to lead at concentrations similar to those at this site have caused learning deficiencies and changes in the blood. Estimated minimal risk levels for the ingestion of lead based on currently available monkey studies show adverse learning effects at levels below the estimated doses for the highest levels of lead found on the site (neurobehavioral effects). Changes in the blood including decrease in erythrocyte ALA-D, a decrease in heme synthesis, and an increase in erythrocyte protoporphyrin have been observed in humans at exposure levels less than those existing at this site. Rats exposed to these levels over their entire lifespan experienced kidney and reproductive toxicity (ATSDR, 1990).

Human exposures to the levels of radiation from radium and gross alpha in ground water at this site exceed EPA's Maximum Contaminant Levels (MCLs) of 5 pCi/L for radium and 15 pCi/L for gross alpha. The International Commission on Radiological Protection has set an annual limit on intake (ALI) for radium deposited on bone surfaces to about 1.9 microcurie by ingestion (ICRP, 1979). The greatest dose potential for alpha-radiation from naturally occurring radionuclides in drinking water is related to the ingestion of radium-226 in areas where its concentration is high (National Academy of Sciences, 1977). Radium and alpha particles enter the body when they are breathed or swallowed. Radium decays by the emission of alpha and gamma particles and has a physical half-life of 1,600 years. Alpha particles are not known to cross the skin and it is not known if gamma radiation from radium can cross the skin. The fraction of radium transferred from the gastrointestinal tract to the blood is 20 percent, and 87 percent of this fraction is transferred to the skeleton, with soft tissue receiving the remaining 13 percent (Eisenbud, 1987).

Radon was not measured for this study but is a daughter product of radium. Radon is an inert gas which has been linked to lung cancer in humans. Analysis for radon would be necessary to address its site-related health implications. The National Academy on Radiation Protection (NARP, 1984) estimates that the risk of developing lung cancer following a lifetime exposure to radon is 2.1×10^{-3} per pCi/L exposure under environmental conditions. Radon has a half-life of 3.8 days and decays by alpha and gamma emissions. The radiation dose from radioactive radon decay products pose a greater risk than exposure to the original radon (BIER, 1988). Radon decay products ultimately decay to nonradioactive lead. Presently there is no MCL for radon in water; however, the EPA has proposed a MCL of 300 pCi/L (56 CFR 33050).

Levels of radium and gross alpha found at this site may increase the risk of bone cancer but are unlikely to cause other effects seen at higher exposure levels (Charp, 1991 personal communication). Short- and long-term health effects other than cancer from low level exposure to radium are not known. The relationship between the level of exposure and length of time before adverse health effects become apparent is not well understood.

Human health effects from ingestion of low concentrations of PCBs similar to those found in on-site soil and ground water have not been studied. However, the estimated minimal risk level for ingestion of PCBs, which are based on currently available animal studies, are greater than the highest levels detected in the on-site soil and ground water. Therefore harmful noncancer effects from exposure to PCBs are not expected to occur (ATSDR, 1989). At high exposure concentrations in humans (higher than at this site) PCB exposures have been associated with liver cancer. Because of this association, the EPA has proposed a drinking water standard of 0.5 ug/L for PCBs to protect against adverse health effects including cancer. Water with PCB concentrations greater than 0.5 ug/L should not be used for drinking. It is unlikely, however, that the risk of an additional cancer, after a lifetime of drinking water at 0.5 ug/L of PCBs, will be greater than one in one million.

Long-term (more than 2 weeks) inhalation of PCBs at similar concentrations found to those at this site have been associated with skin irritation in humans and liver damage in animals (ATSDR, 1989).

B. HEALTH OUTCOME DATA EVALUATION

The results of the 1984 NIOSH investigation were compared to criteria recommended by NIOSH and ACGIH, and OSHA's Permissible Exposure Limits (PEL). No elevated radiation levels were detected on the site. Personal air monitoring of 2 emission control dust remedial workers indicated that they were at risk from exposure to unacceptable levels of airborne lead. Personal air monitoring for two Florida Steel employees, a maintenance person and a fabricator/welder, showed PCB air concentrations of 0.8 micrograms per cubic meter ($\mu g/M^3$) (Salisbury, 1987). This concentration approaches the NIOSH evaluation criteria of 1.0 mg/M^3. These results indicate that prior to incineration of contaminated soil and emission control dust, workers at this site may have been exposed to unacceptable concentrations of lead and PCBs in the air. Since health outcome data for workers at this site are unavailable, it is not known if they actually suffered adverse health effects from lead and PCB exposure. Florida HRS is not aware of what follow-up actions OSHA or NIOSH may have taken in regard to worker exposures.

No adverse health effects are believed to have occurred in off-site populations because there are no known completed exposure pathways. HRS epidemiologists found that the rates of cancer and birth defects in the population near the Florida Steel site are not unusual.

C. COMMUNITY HEALTH CONCERNS EVALUATION

People living near this site have expressed few health concerns. On January 14, 1992, the Florida HRS mailed a fact sheet to the local residents, media, and elected officials. That fact sheet summarized the finding of the draft public health assessment, announced its availability at the local document repository, and solicited public comment. Florida HRS did not receive any inquiries or comments by the February 28, 1992 deadline.

CONCLUSIONS

This site is a public health hazard. If this site is not remediated, exposures to lead and PCBs in soil and lead and radium in ground water may occur at concentrations that, upon long-term exposure, could cause adverse health effects. Based on available information, the following conclusions have been made:

1. Soil at this site contains high levels of lead and low levels of PCBs.

2. This site was a health hazard for past workers and continues to be a health hazard for future remediation workers. During past operations, workers may have been exposed to lead and PCBs in excess of NIOSH recommended exposure limits. If proper personal protective equipment is not used, remediation workers could be exposed to unacceptable levels of lead and PCBs through dermal contact with contaminated soil, inhalation of contaminated dust, or incidental ingestion of contaminated soil.

3. The contaminated ground water is not suitable for drinking water or bathing use.

4. HRS epidemiologists found that the rates of cancer and birth defects in the population near the Florida Steel site are not unusual. Other community-specific health outcome data are unavailable. No adverse health effects on the surrounding community residents are expected, however, since there are no completed exposure pathways.

RECOMMENDATIONS

1. Remediate contaminated soil and sediments before using the site again.

2. Assure appropriate safety precautions are taken by personnel performing site sampling and remediation work. Workers

exposed to emission control dust should wear proper personal respiratory protective equipment. Until soil remediation is completed, conduct routine blood testing for workers to monitor lead and PCB exposure.

3. Remediate contaminated ground water to reduce the potential for adverse health effects from future exposure to metals and radionuclides. Until the contaminated ground water is remediated, limit the installation of new wells in the area of ground-water contamination or areas where the ground water is likely to become contaminated.

The data and information developed in the Florida Steel Corporation Public Health Assessment have been evaluated by the ATSDR Health Activities Recommendation Panel (HARP) for appropriate public health actions. Human exposure to site contaminants likely occurred in the past, but exposure is not believed to be occurring now. Because of the difficulty of defining the duration of past exposure and the population exposed, and the lack of evidence of ongoing exposure to contaminants at levels of public health concern, HARP determined that no further follow-up public health actions are indicated at this time. If information becomes available that indicate human exposures are occurring at levels of public health concern, ATSDR will evaluate that information to determine what actions, if any, are necessary.

PUBLIC HEALTH ACTIONS

No health follow-up actions are planned for the site at this time. New information will be evaluated to determine if health actions are needed in the future.

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CERTIFICATION

This public health assessment has been prepared by the Florida Department of Health and Rehabilitative Services, Office of Toxicology and Hazard Assessment, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health assessment and concurs with its findings.

Director, DHAC, ATSDR

BIBLIOGRAPHY AND REFERENCES

Ardaman & Associates, 1988A. Work plan, Remedial Investigation/Feasibility Study (RI/FS), Florida Steel Corporation Indiantown Mill Site, Martin County, Florida. Ardaman Associates, Inc. - 2/24/88.

Ardaman & Associates, 1988B. Response to comments RI/FS work plan Florida Steel Corporation Indiantown Mill Site, Martin County, Florida; February 2, 1988.

Ardaman & Associates, 1988C. Remedial Investigation - Phase I, Florida Steel Corporation Indiantown Mill Site, Martin County, Florida - VOLUME I - September 30, 1988.

Ardaman & Associates, 1989. Remedial Investigation - Phase II, Florida Steel Corporation Indiantown Mill Site, Martin County, Florida - VOLUME I - October 17, 1989.

ATSDR, 1988A. Agency for Toxic Substances and Disease Registry (ATSDR). Preliminary Health Assessment for Florida Steel, April, 1989.

ATSDR, 1988B. Agency for Toxic Substances and Disease Registry (ATSDR) Site Summary - 3/22/88.

ATSDR, Draft Toxicological Profile for Radium, October 1989.

ATSDR, Toxicological Profiles for: SELECTED PCBS (AROCHLOR - 1260, - 1254, - 1248, - 1242, - 1232, - 1221, AND - 1016, ATSDR/TP-88/21. June 1989.

ATSDR, Toxicological Profile Lead, ATSDR/TP-88/17, June 1989.

ATSDR, 1990. Draft Health Assessment Guidance Manual, Soil Environmental Media Evaluation Guide, U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry.

BIER IV, 1988. National Research Council. Health risks of radon and other internally deposited alpha-emitters. Washington, D.C.: National Academy Press, 1990.

Bryant, R., 1990. Personal Communication: Draft Remedial Investigation Fact Sheet, Florida Steel Corporation, Indiantown, Florida, USEPA, November 27, 1990.

Charp, Paul, et al. ATSDR. Personal Communication. 1990.

Eisenbud M., 1987. Environmental radioactivity from natural, industrial, and military sources, 3rd ed. New York: Academic Press, Inc., 1987:475

Envirologic Data, 1990A. Response to Comments on Human Health and Environmental Risk Assessment of the Florida Steel Corporation Indiantown Mill Site, Martin County, Florida. April 4, 1990. Prepared for Florida Steel Corporation, Tampa, Florida.

Envirologic Data, 1990B. Human Health and Environmental Risk Assessment of the Florida Steel Corporation Indiantown Mill Site, Martin County, Florida. August 1990. Prepared for Florida Steel Corporation, Tampa, Florida.

ICRP, 1979. Limits for the intake of radionuclides by workers. International Commission of Radiological Protection 30, - Part 1. New York: Pergamon Press, 1979.

Lichtler, W.F. 1960. Geology and Ground Water Resources of Martin County, Florida. Florida Geological Survey - Report of Investigations No. 23; Tallahassee, Florida.

Mark Schultz Associates, 1988. Results of groundwater sampling through December 1987 for Florida Steel Corporation Indiantown, Martin County, Florida. Mark Schultz Associates - 4/27/88.

Morris, B.G., 1990. Declaration of Covenants, Conditions and Restriction (for the real property in Martin County, Florida). Allen, Dell, Frank, & Trinkle, August 22, 1990.

National Academy of Sciences, 1977. Drinking Water and Health, National Academy of Sciences, 2101 Constitution Ave, Washington, D.C 20418

NIOSH, 1984. National Institute for Occupational Safety and Health. Manual of Analytical Methods, 3rd Ed., Cincinnati, OH: NIOSH, DHEW, (NIOSH) Publication No. 84-100.

USEPA, 1983. Radionuclide Removal for Small Public Water Systems. SMC Martin Inc. Office of Drinking Water (WH - 550), or Environmental Protection Agency (EPA) 570/0 - 83 - 010

USEPA, 1986. Office of Water Regulations and Standards. Quality for Water 1986. Washington, D.C.: Environmental Protection Agency (EPA), May 1986. EPA/440/5-86-001. (May 1, 1987, update).

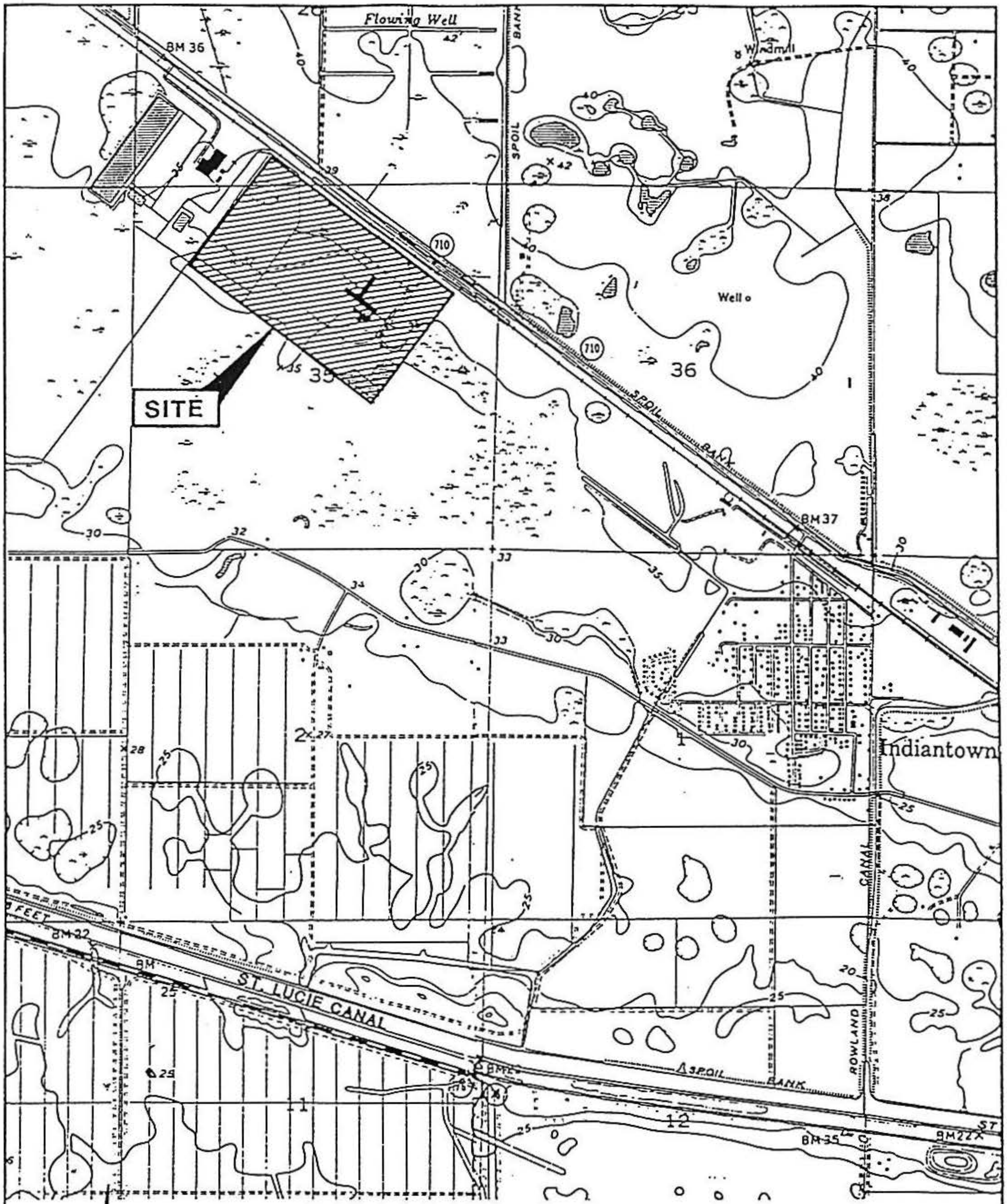
USEPA 1987. Polychlorinated Biphenyls Spill Cleanup Policy, Federal Register (CFR) Part 761.

USEPA 1989A. OSWER (OS - 230), ORD (RD - 689), OERR 9200.6 - 303 - (89 - 4), Health Effects Assessment Summary Tables (HEAST), Fourth Quarter FY 1989 and IRIS update May 1, 1990 (used for determining that Carcinogen Potency Factors have not been calculated for gross alpha and radium)

USEPA 1989B. Risk Assessment Guidance for Superfund, Vol. 1, Human Health Evaluation Manual (Part A) Office of Emergency and Remedial Response, Environmental Protection Agency. EPA/540/1-89/002.

USEPA, 1990. Toxicity Characteristics Leaching Procedure, Appendix 11 to 40, Federal Register (CFR) Part 261

APPENDIX



SITE LOCATION MAP

SECTION 35
TOWNSHIP 39, SOUTH
RANGE 38, EAST

Figure 1

0 2000
SCALE FEET

OBTAINED FROM USGS QUAD MAP- OKEECHOBEE 4 SE, FLORIDA (PHOTOREVISED 1983)

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing

FLORIDA STEEL CORPORATION
INDIANTOWN MILL
INDIANTOWN, FLORIDA

DRAWN BY: REB	CHECKED BY:	DATE: 11/16/87
FILE NO. 83-119	APPROVED BY:	

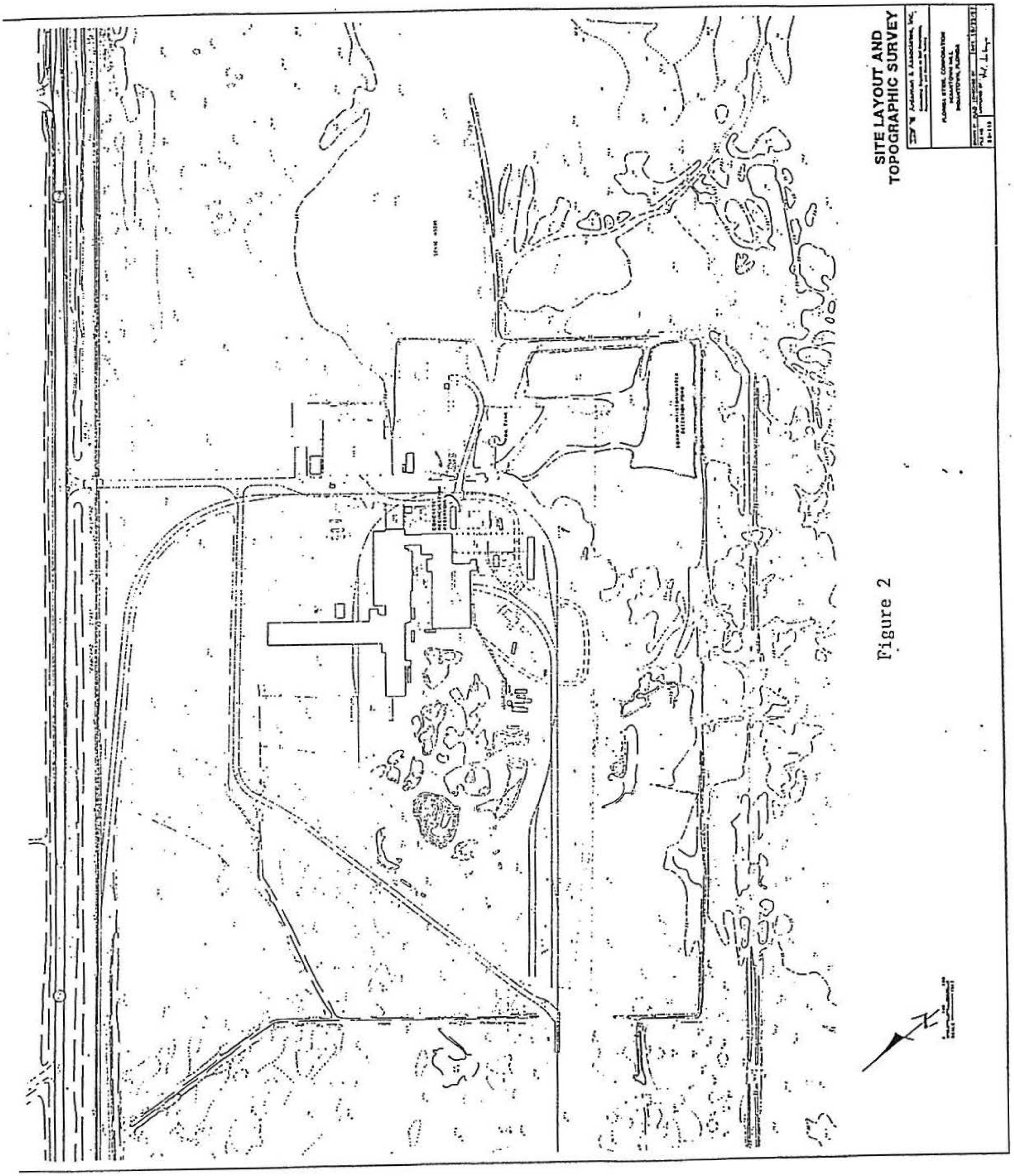

SITE LAYOUT AND
TOPOGRAPHIC SURVEY
FLORIDA STEEL CORPORATION
INDIANTOWN MILL
INDIANTOWN, FLORIDA

Figure 2

25

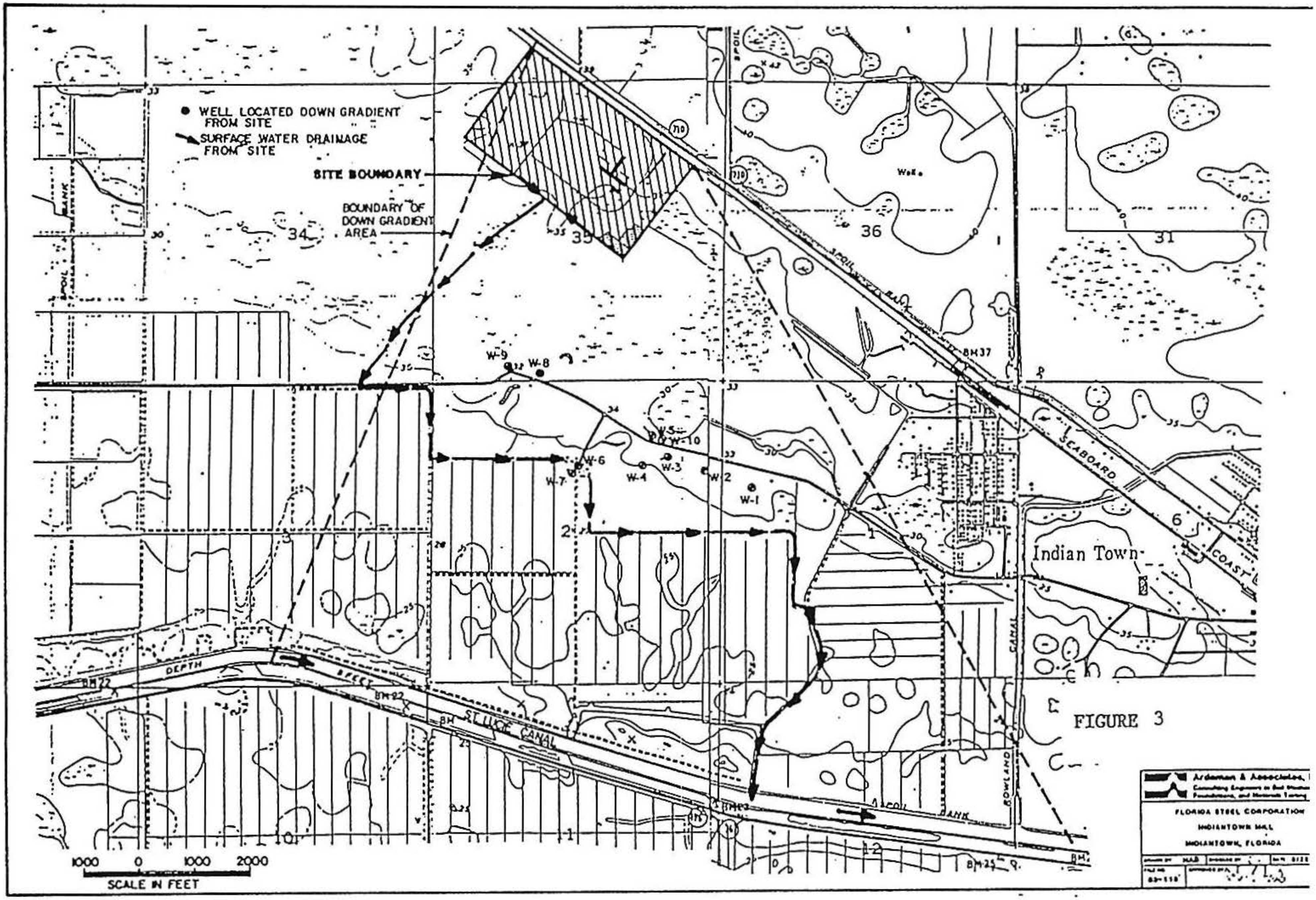

WELL LOCATED DOWN GRADIENT FROM SITE
SURFACE WATER DRAINAGE FROM SITE
SITE BOUNDARY
BOUNDARY OF DOWN GRADIENT AREA
34
35
36
31
W-9
W-8
W-5
W-10
W-6
W-7
W-4
W-3
W-2
W-1
BM37
SEABOARD
COAST
Indian Town
ST LUCIE CANAL
DEPTH
SPOIL BANK
CANAL
ROWLAND
1000 0 1000 2000
SCALE IN FEET
Ardaman & Associates, Inc.
FLORIDA STEEL CORPORATION
INDIANTOWN MILL
INDIANTOWN, FLORIDA

FIGURE 3

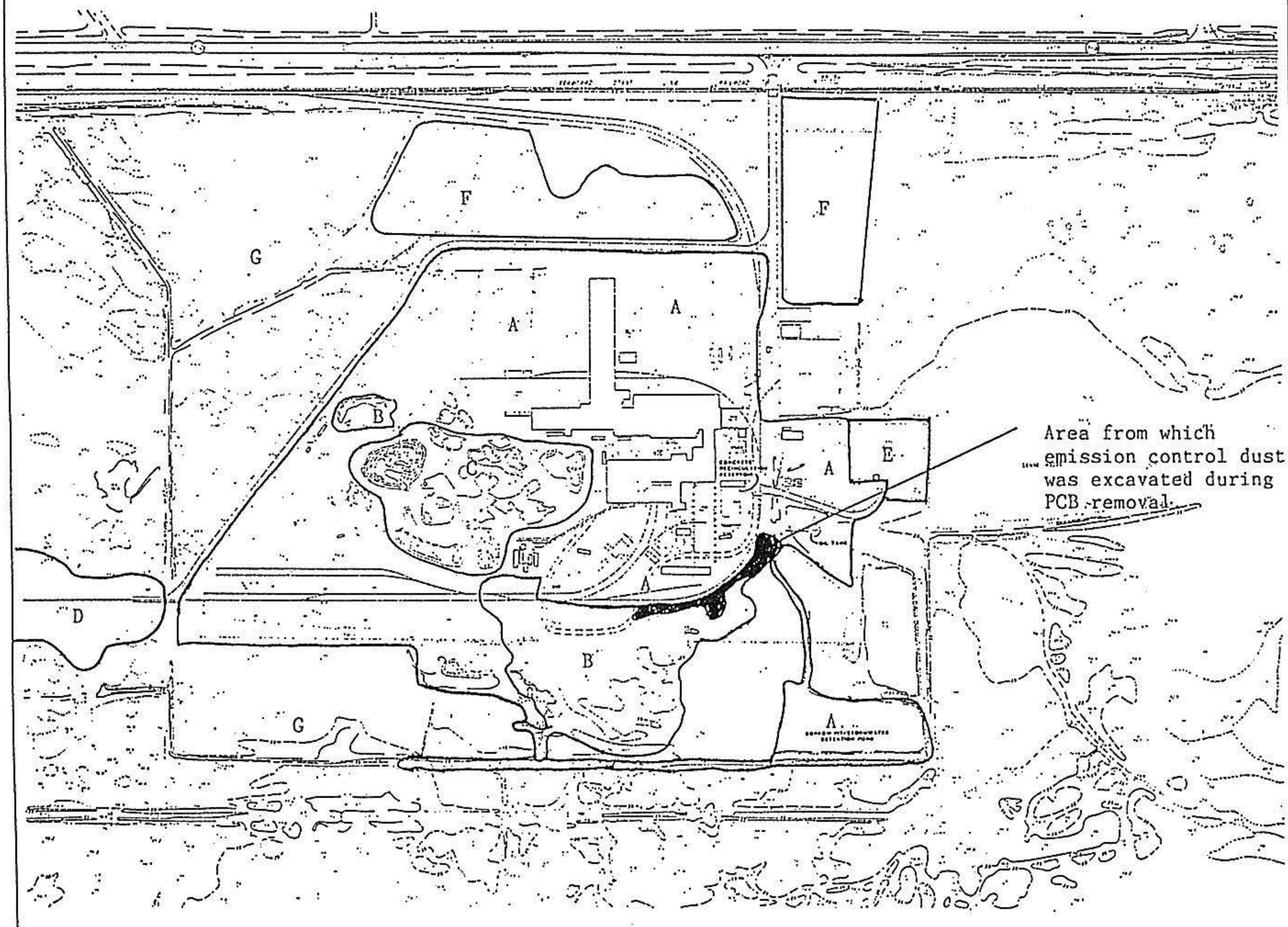


Figure 4: Delineation of Investigated Areas

TABLE 1

WATER SUPPLY WELLS DOWNGRADIENT FROM THE FLORIDA STEEL CORPORATION SITE - INDIANTOWN, FLORIDA

Well No. [1]	Well Description
W-1	Probably shallow, 2-inch or less diameter
W-2	Two-inch well reported to be 30 feet deep
W-3	No specifications available
W-4	Reported to be 100 feet deep; installed in 1980
W-5	Reported to be 104 feet deep
W-6 & W-7	Two wells reported to be 60-100 feet deep
W-8	Reported to be over 100 feet deep
W-9	Reported 30 feet deep; hand dug
W-10	Reported 103 feet deep; completed 5/5/89

Source: Ardaman and Assoc., 1989