United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R04-92/122
June 1992

EPA

Superfund Record of Decision:

Florida Steel, FL

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R04-92/122	2.	3. Recipient's Accession No.

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SUPERFUND RECORD OF DECISION
Florida Steel, FL
First Remedial Action - Subsequent to follow

5. Report Date 06/30/92

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

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14.

15. Supplementary Notes
PB93-964020

16. Abstract (Limit: 200 words)

The 150-acre Florida Steel site is located 2 miles northwest of Indiantown, Martin County, Florida. Surrounding land use is mixed industrial and agricultural. The site is located within the Indian River Lagoon Drainage Basin System, and adjacent property is a mixture of uplands and wetlands. Several private residences are within 1 mile downgradient of the site. In 1969, the Indiantown site was acquired by Florida Steel Corporation (FSC) for the purpose of constructing a steel mill using electric arc furnace technology for recycling scrap steel, primarily junk automobiles, into new steel products. The mill operated from 1970 until 1982, at which time it was shut down because of depressed economic conditions. Three types of by-products were produced at the mill: mill scale, which is the oxidized iron that sloughs off hot steel as it is being cooled by water; slag formed on top of the steel in the furnace, which contains barium, chromium, and lead; and emission control (EC) dust from the electric arc furnace, which contains iron, zinc, and lead oxides. The EC dust was collected in a baghouse system and deposited in two onsite disposal areas until 1980, when EC dust became listed as a RCRA hazardous waste (K061) and had to be manifested offsite for

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Florida Steel, FL
First Remedial Action - Subsequent to follow
Contaminated Media: soil, sediment, debris
Key Contaminants: organics (PCBs), metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 56
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

disposal. In 1983, state investigations revealed PCB contamination of soil in the area of a recirculating reservoir and in the EC disposal areas. In 1985, the state required FSC to remove approximately 8,000 tons of EC dust from the disposal areas and send it to an offsite recycling facility for zinc recovery. A second removal action, conducted in 1986, involved excavating 11,200 cubic yards of contaminated soil, sediment, and EC dust containing PCBs greater than 50 mg/kg and temporarily storing the materials in an onsite storage vault, as well as implementing an onsite ground water monitoring program. The stored PCB-contaminated soil was later incinerated onsite under a consent order with EPA in 1987, and ash from this incineration was consolidated within the ash retention building pending final deposition. This ROD addresses the remaining contaminated onsite soil, sediment, and debris as OU1. The primary contaminants of concern affecting the soil, sediment and debris are organics, including PCBs; and metals, including lead.

The selected remedial action for this site includes excavating and disposing offsite 600 cubic yards of soil and sediment contaminated with PCB levels equal to or greater than 50 mg/kg; excavating and onsite solidification of 37,000 cubic yards of EC dust and metals-contaminated ash and soil, including soil with lead concentrations above 600 mg/kg and/or PCB concentrations between 25 and 50 mg/kg; temporarily storing the excavated materials onsite pending final
treatment in a manner that will prevent PCB contamination through surface water run-off, and disposing of the solidified materials in an onsite double-lined landfill with a RCRA cap; controlling surface water run-off from the site by routing it to the onsite surface water retention pond; periodic monitoring of surface water for at least 2 years after construction is completed; continuing ground water quality monitoring; and implementing institutional controls, including deed restrictions. The estimated present worth cost for this remedial action is $7,004,750, which includes an annual O&M cost of $18,200 for 30 years.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific soil excavation goals are based on health risk levels and the leachability of lead from soil into the underlying ground water, including lead in soil 600 mg/kg; PCBs 25 mg/kg; and slag, which contains lead 1360 mg/kg. The slag level was developed to be protective of human health in an industrial setting, and additional TCLP testing will be conducted during the RD stage to confirm its protectiveness. Compliance with the RCRA land disposal treatment standards for EC dust will be attained by meeting levels specified in the treatability variance for contaminated soil and debris.

RECORD OF DECISION
THE DECLARATION

SITE NAME AND LOCATION

Florida Steel Corporation
Indiantown, Martin County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the site noted above. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of Florida has concurred with this Record of Decision.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This response action represents the first of two planned operable units at the site. However, several actions were taken prior to this first operable unit. The first action was the removal of emission control (EC) dust piles from the site during 1985 with the approval of the Florida Department of Environmental Regulation (FDER). The second action, in 1986, was the excavation and on-site storage of soil contaminated with polychlorinated biphenyls (PCBs) as described in a consent agreement between Florida Steel Corporation (FSC) and FDER. In 1987, the PCB contaminated soil was incinerated in accordance with a consent order between FSC and the U.S. Environmental Protection Agency (EPA).

This remedy addresses the remaining source, incinerator ash, soil and sediment contamination at the site. This remedy addresses the principal threat at the site by excavating and treating the EC dust and the most highly contaminated soils. The second planned operable unit at this site will address contamination in off-site wetlands and contaminated groundwater.

The major components of the remedy for this first operable unit include:

- Excavation and off-site disposal at an EPA approved facility of approximately 600 cubic yards of soil contaminated with PCB levels

equal to or greater than 50 ppm.

•Excavation and on-site solidification of approximately 37,000 cubic yards of the following:
- -EC dust and metals contaminated soil and ash. All EC dust and ash would be excavated and treated; soil containing lead above 600 ppm would be excavated and treated.
- -soil containing PCB levels between 25 and 50 ppm;

No excavation will take place below the water table. Current knowledge of contaminant distribution at the Site would indicate that no excavation below the water table will be required.

•Control of surface water runoff from the site during remediation of on-site soils.

•Compliance with Resource Conservation and Recovery Act (RCRA) Land Disposal Restriction treatment standards for EC dust, which is the listed RCRA waste K061, by meeting levels specified in the treatability variance for contaminated soil and debris.

•Disposal, in an on-site double lined RCRA landfill with a RCRA cap, of all solidified material. The landfill would meet the provisions of 40 C.F.R. Subpart N landfill requirements and would be built above the water table.

•Periodic monitoring of surface water and groundwater quality. The quality of surface water runoff should be consistent with possible future criteria developed for the adjacent wetlands in the second operable unit for this site. Groundwater quality would be monitored for up to 30 years.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment for the reduction of toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

Because the remedy will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

6-30-92
Date

Patricia M Tobin
Greer C. Tidwell
Regional Administrator

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RECORD OF DECISION
THE DECISION SUMMARY
FLORIDA STEEL CORPORATION
INDIANTOWN, FLORIDA

1.0 SITE NAME, LOCATION, DESCRIPTION

The Florida Steel Corporation (FSC) Site is located on Highway 710 approximately two miles northwest of Indiantown, Florida. The Site is approximately two miles northeast of the St. Lucie Canal and is located within the Indian River Lagoon Drainage Basin System. The Site covers approximately 150 acres and is bounded on the north by the Seaboard Coast Line (CSX) railroad and State Highway 710 (see Figures 1 and 2). Beyond the highway, for several miles to the north, there is only unimproved land. The adjacent property is a mixture of uplands and wetlands, with little overall variation in elevation.

Indiantown is a small community in Martin County. It is located on State Highway 710, near the St. Lucie Canal, about 25 miles west of Stuart, the county seat, and 40 miles northwest of the city of West Palm Beach. The Indiantown population of about 5,000 is mostly employed in the nearby citrus farms and in local commerce. A large area west of Indiantown and surrounding the FSC steel mill site is zoned industrial.

The nearest downgradient residence is about one-half mile south of the FSC property, and is a single family private dwelling. There are several other dwellings located within one mile downgradient of the site.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Indiantown site was acquired by FSC in 1969 for the purpose of constructing a steel mill using electric arc furnace technology for recycling scrap steel, primarily junk automobiles, into new steel products including concrete reinforcing steel and round and square merchant bar.

The Indiantown steel mill operated from November 1970 until February, 1982, when, because of the prevailing depressed economic conditions, FSC decided to temporarily cease production at the facility. The mill has not been operated since that time and the company has no present plans for its reopening.

Three types of byproducts were produced at the Indiantown Mill. These were mill scale, slag, and emission control (EC) dust. Mill scale is the oxidized iron that sloughs off the hot steel as it is being cooled with water sprays. It accounts for roughly 2 percent of the steel produced and has the same composition as the steel.

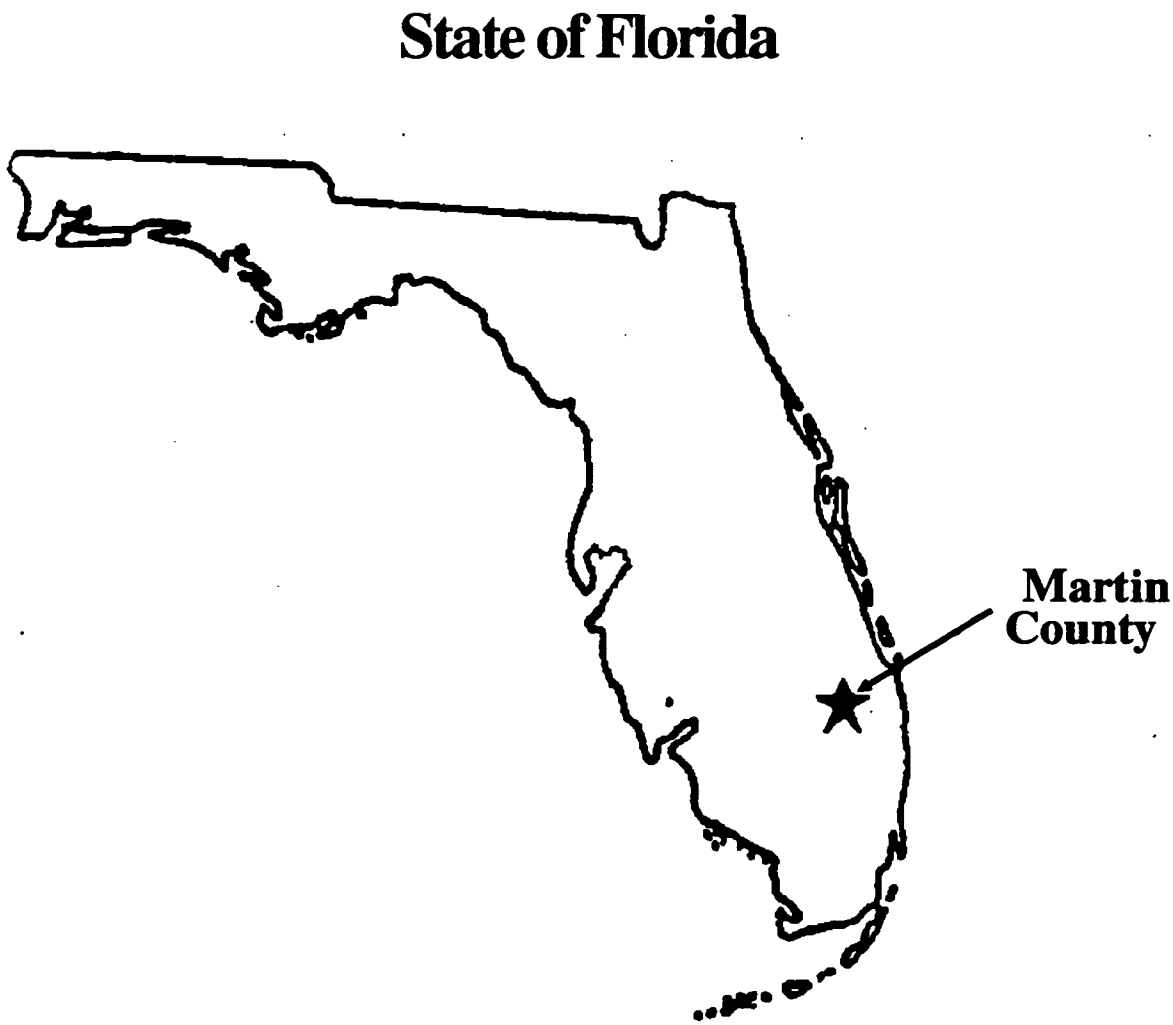
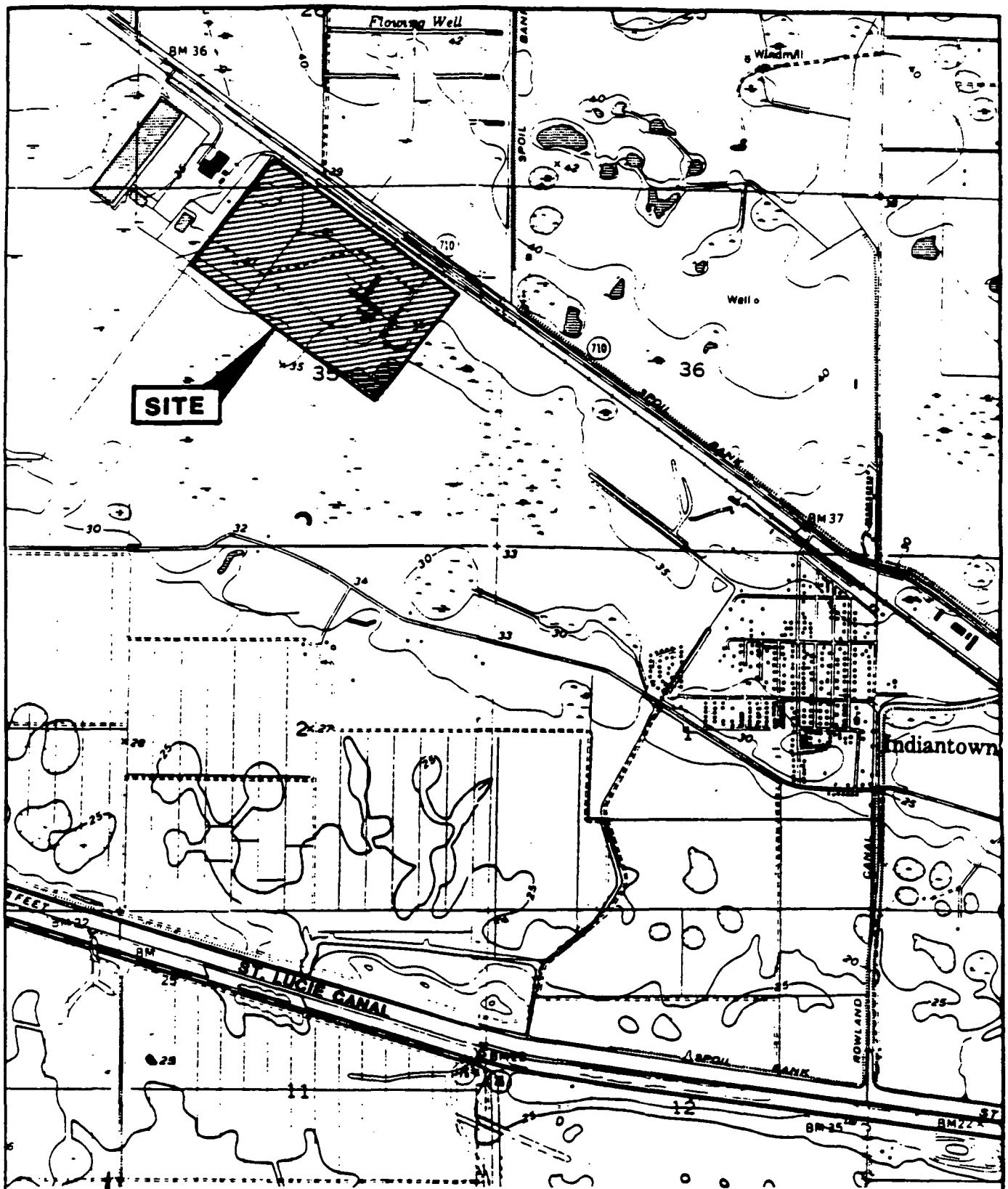


Figure 1 : General Location Map
Florida Steel Corporation
Martin County
Indiantown, Florida



SITE LOCATION MAP

SECTION 35
TOWNSHIP 39, SOUTH
RANGE 38, EAST

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

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Slag is formed on top of the steel in electric arc furnaces. It is formed from lime, which is introduced as a flux into the furnace to remove impurities such as soil and sand from the molten steel. Total primary metals present in slag are barium, chromium and lead. At Indiantown, the slag was crushed and graded and sold as aggregate and fill material.

EC dust is the fine particulate material generated as the high temperatures (greater than 3000 degrees F.) in an electric arc furnace drive off and oxidize some of the iron and most of the other volatile metals contained in the scrap. Roughly 25 to 30 lbs of EC dust are generated for every ton of steel produced. Typically at the Site, the major constituents in EC dust, in order of decreasing concentrations, are iron oxide, zinc oxide, and lead oxide.

During the lifetime of the plant, from November 1970 to February 1982, the EC dust was collected by a system of baghouses. Until November 17, 1980, the dusts captured in the baghouses were deposited in two on-site disposal areas (area B on Figure 3). After November 18, 1980, EC dust was regulated as an EPA-listed hazardous waste (K061). Between November 18, 1980, and February 1982 the EC dust generated at Indiantown was shipped off-site under RCRA manifest.

In December 1982, the FSC Indiantown Mill property was included on the National Priority List (NPL) under the provisions of CERCLA. The listing was based on the potential threat to the environment from the heavy metals present in the EC dust and the shallow water table. Early in 1983, FSC met with the FDER District Office and commenced the first phase of the site investigation, focusing on the EC dust disposal areas.

In March 1983 it was discovered that some of the soils in the vicinity of the concrete recirculating reservoir (CRR) and a small portion of the area containing the EC dust were contaminated with PCBS. The PCB contamination has been attributed to the use, in the early 1970s, of hydraulic fluid containing PCBs.

During 1985, FSC removed approximately 8000 tons of EC dust from both of the EC dust disposal areas and shipped it under manifest to a metal recycling facility for zinc recovery. Some EC dust was also removed as part of the PCB cleanup. However, EC dust is still present in the former disposal areas.

In compliance with the Consent Agreement between FSC and FDER dated September 4, 1985, approximately 11,200 cubic yards (18,800 tons) of soil, sediment and EC dust containing PCBs at a concentration of 50 ppm and above were excavated from the site between February 15, 1986 and May 8, 1986, and temporarily placed in a specially constructed secure on-site storage vault. The

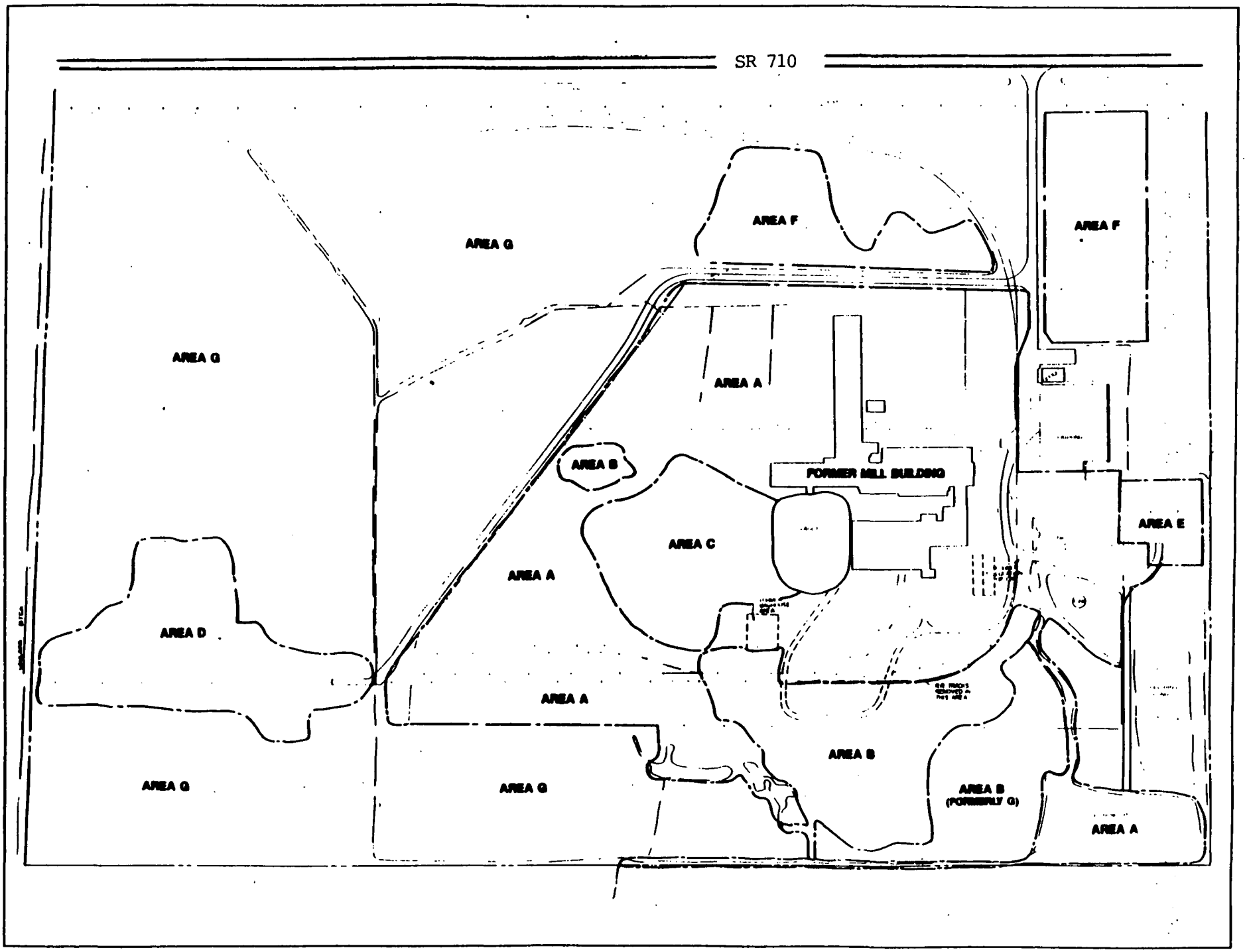


Figure 3: Site Layout

excavations were then backfilled with clean fill material.

Also in 1986, Florida Steel began a periodic groundwater monitoring program at the site.

In October 1986, Florida Steel developed a separate Feasibility Study that described options for the treatment of the PCB contaminated soil in the vault. In 1987, based on this feasibility study, Florida Steel was directed to incinerate the PCB contaminated soil.

In compliance with the Administrative Order on Consent between FSC and EPA dated September 21, 1987, incineration of the material in the vault began during October 1987 and was completed in May 1988.

Because of the presence of heavy metals, ash from the incineration was consolidated within the ash retention building pending final disposition. Final disposition of the ash is addressed by the ROD.

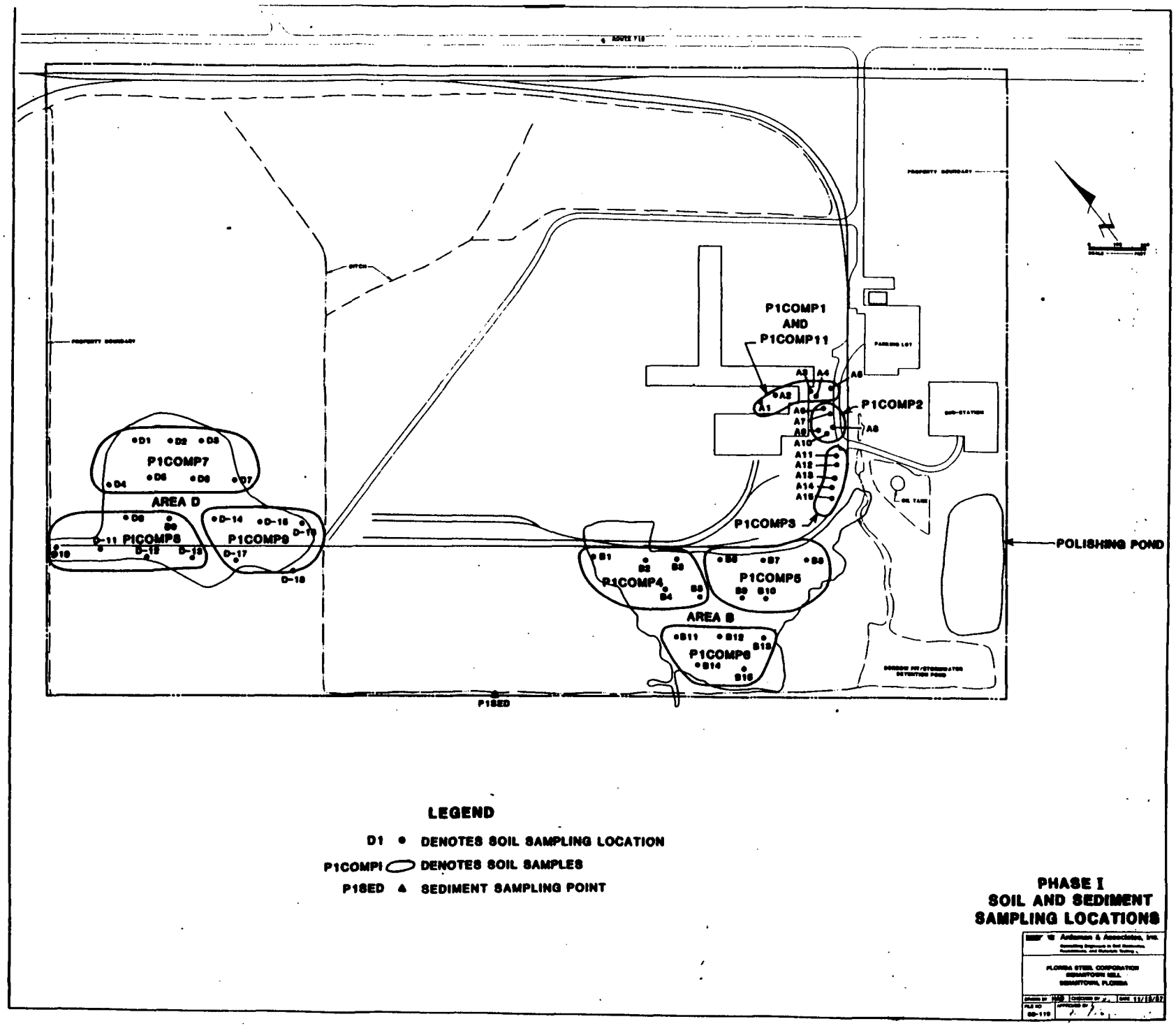
FSC received a Special Notice Letter from EPA dated May 22, 1987 requesting that FSC conduct the Remedial Investigation/ Feasibility Study (RI/FS). The letter also stated that if FSC declined, then EPA would conduct the RI/FS and seek to recover its costs. FSC was the only party to receive a notice letter. A title search confirmed that Florida Steel was the only owner at the site.

FSC ultimately agreed to conduct the RI/FS. The State of Florida requested the enforcement lead for the project and an Order on Consent between FDER and FSC was signed September 22, 1987 (OGC #84-0150).

In 1988, FDER directed Florida Steel to conduct a RI at the site. The RI was conducted in two phases. During Phase I, soil and groundwater samples were collected from the most frequently used areas of the site. These samples were analyzed for the full range of hazardous substances. Metals such as cadmium, chromium, iron, lead, zinc were found in the samples. Figure 4 shows the location of the Phase I sampling points.

Phase II of the RI included additional sampling to further define the extent of EC dust and to determine if PCBs were present in areas outside those previously addressed. Soil samples were collected from across the entire site and analyzed for PCBs and the metals that were most commonly found during Phase I. Figure 5 shows the Phase II sampling locations.

A Baseline Risk Assessment for the Indiantown site was submitted by Envirologic Data, Inc. The Baseline Risk Assessment evaluated the current and potential risks posed by the contamination at the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AND
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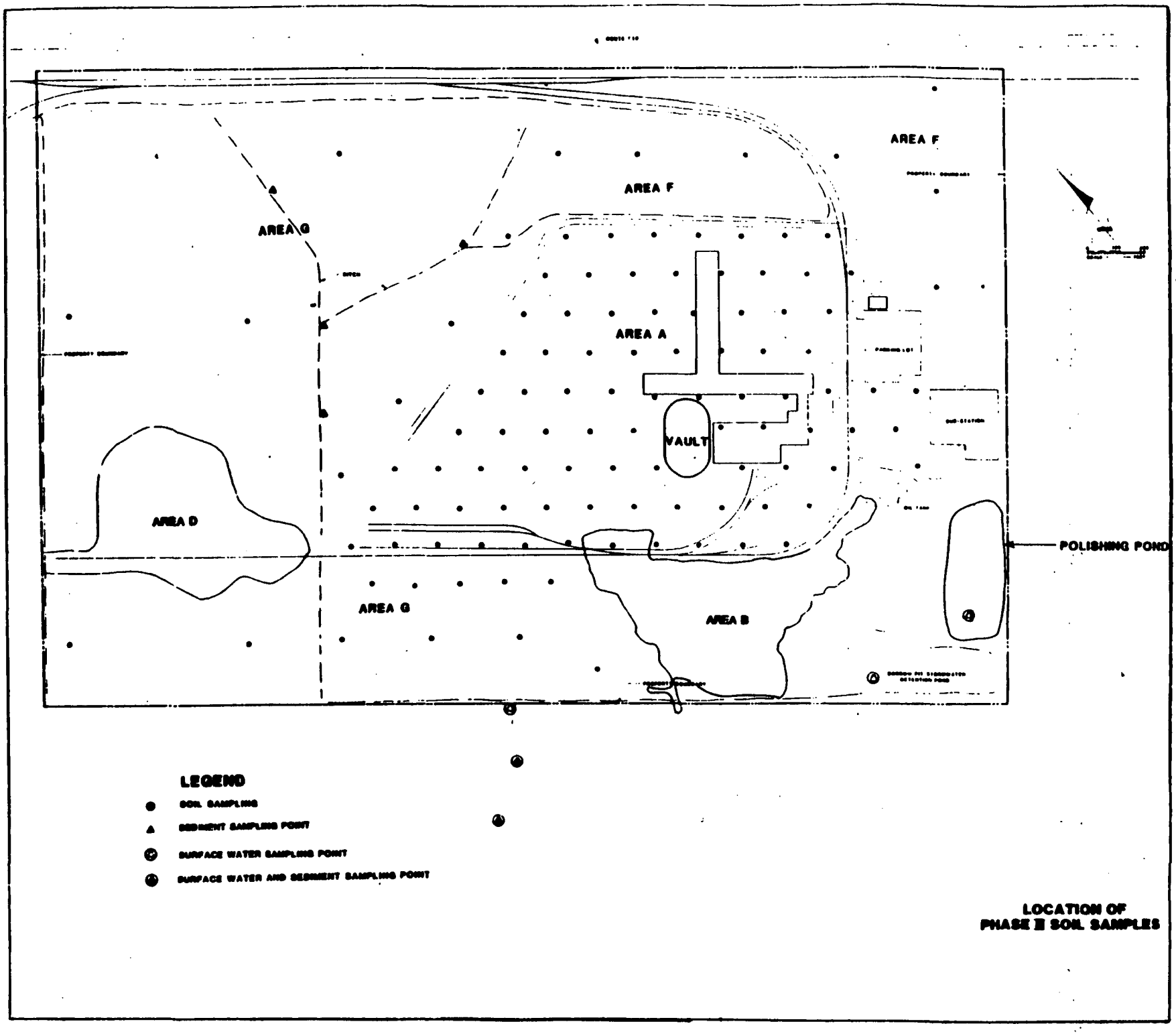
P1COMP6
P1COMP7
P1COMP8
P1COMP9
AREA D
AREA B
POLISHING POND
P1SED
LEGEND
D1 DENOTES SOIL SAMPLING LOCATION
P1COMPI DENOTES SOIL SAMPLES
P1SED SEDIMENT SAMPLING POINT
PHASE I
SOIL AND SEDIMENT
SAMPLING LOCATIONS

Figure 4



LOCATION OF
PHASE II SOIL SAMPLES

site under the no-action scenario for current future uses of the site.

The Feasibility Study (FS) was prepared after completion of the RI and Risk Assessment. The FS evaluated a range of remedial alternatives that would permanently reduce the volume, toxicity, and/or mobility of any contaminants of concern remaining at the site.

3.0 HISTORY OF COMMUNITY RELATIONS

The RI/FS report and the Proposed Plan for the Site were released to the public for comment on April 27, 1992. These two documents were made available to the public in both the administrative record and an information repository maintained at the EPA Docket Room in Region IV and at the Indiantown Public Library (see Appendix A for an index of the administrative record).

The notice of availability for these two documents was published in the Stuart News on April 20, 1992 and in the Indiantown News on April 22, 1992. The notice also advertised the upcoming public meeting and the availability of site documents at the Indiantown Public Library. The public comment period on the documents was held from April 27, 1992 until May 27, 1992.

Over 600 fact sheets summarizing the proposed plan, advertising the upcoming public meeting, and noting the availability of site documents at the Indiantown Public Library were mailed on April 20.

A public meeting was held on April 30, 1992. At this meeting, representatives from EPA and FDER answered questions about site conditions and the remedial alternatives under consideration. A response to the comments received during this meeting and the comment period is included in the Responsiveness summary, which is part of this ROD (see Appendix B).

4.0 SCOPE AND ROLE OF ACTION:

As with many Superfund sites, the problems at the Florida Steel Corporation Site are complex. As a result, EPA has organized the remedial work into two operable units: 1) soil and 2) groundwater and wetlands. This ROD addresses operable unit one - soil at the Site.

The most immediate threats at the site have already been reduced through the removal of EC dust and the incineration of PCB contaminated soil. Remedial actions described for operable unit one will address the residual amounts of EC dust and PCB contaminated soil that remain on-site; the interrelationship between the soil contaminant levels and groundwater protection will be discussed.

Cleanup alternatives are being evaluated for contaminated groundwater and contaminated wetland areas located adjacent to the site. However, additional information is needed before a final decision can be made about the need for and type of cleanup alternatives for both of these media. A decision regarding the groundwater and wetlands will be made later under a second operable unit for this Site after the public comment period has concluded.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Site Geology

The Atlantic Coastal Ridge in Martin County parallels the present coastline and varies in width from about three miles in the southeast corner of the county to about six miles in the central coastal area, and to about four miles in the northern area.

The Eastern Flatlands occupy the area from the Atlantic Coastal Ridge westward to the Everglades and Lake Okeechobee. This is a monotonously flat region with the exception of two elongated ridges known as Orlando Ridge and Green Ridge. Both ridges trend northwest. Green Ridge is in the center of the county and Orlando Ridge in the western half. The Indiantown steel mill is located on the southwestern flank of the Orlando Ridge. The altitude of the Orlando Ridge in Martin County ranges from about 30 to 50 feet above mean sea level, the highest altitude being near the southern part of the ridge. The altitude of Green Ridge is lower than that of Orlando Ridge, ranging from 30 to 35 feet above mean sea level. The altitude of the land surface in the remainder of the Eastern Flatlands generally ranges from slightly less than 20 feet above mean sea level to 30 feet above mean sea level.

In the area north of the St. Lucie Canal, the Eastern Flatlands rise gradually from the valley of the St. Lucie River to Green Ridge. West of Green Ridge the land surface is extremely flat, having an average altitude of 28 feet above mean sea level and a very slight slope to the south. West of the Orlando Ridge the Eastern Flatlands slope gently to the Everglades and the shore of Lake Okeechobee.

There are two major aquifers in Martin County; the shallow (non-artesian) aquifer, from 15 to 150 feet below the land surface, and the Floridan (artesian) aquifer, 600 to 1,500 feet below the land surface. The two aquifers are separated by a thick section of sand and clay of low permeability.

The shallow aquifer is the principal source of fresh water supplies in Martin county. It includes the Pamlico sand, the Anastasia formation and possibly the Caloosahatchee marl with the Anastasia formation probably being the principal source of

groundwater. The shallow aquifer extends from the water table to about 150 feet below the land surface. It is composed principally of sand, but also contains relatively thin beds or lenses of limestone, sandstone, or shell, which are generally more permeable than the sand. Most large-capacity wells are developed in the limestone, sandstone, or shell.

Some fairly large supplies of water and many small water supplies are obtained from the sand by the use of sandpoints, well screens, and open-ended wells.

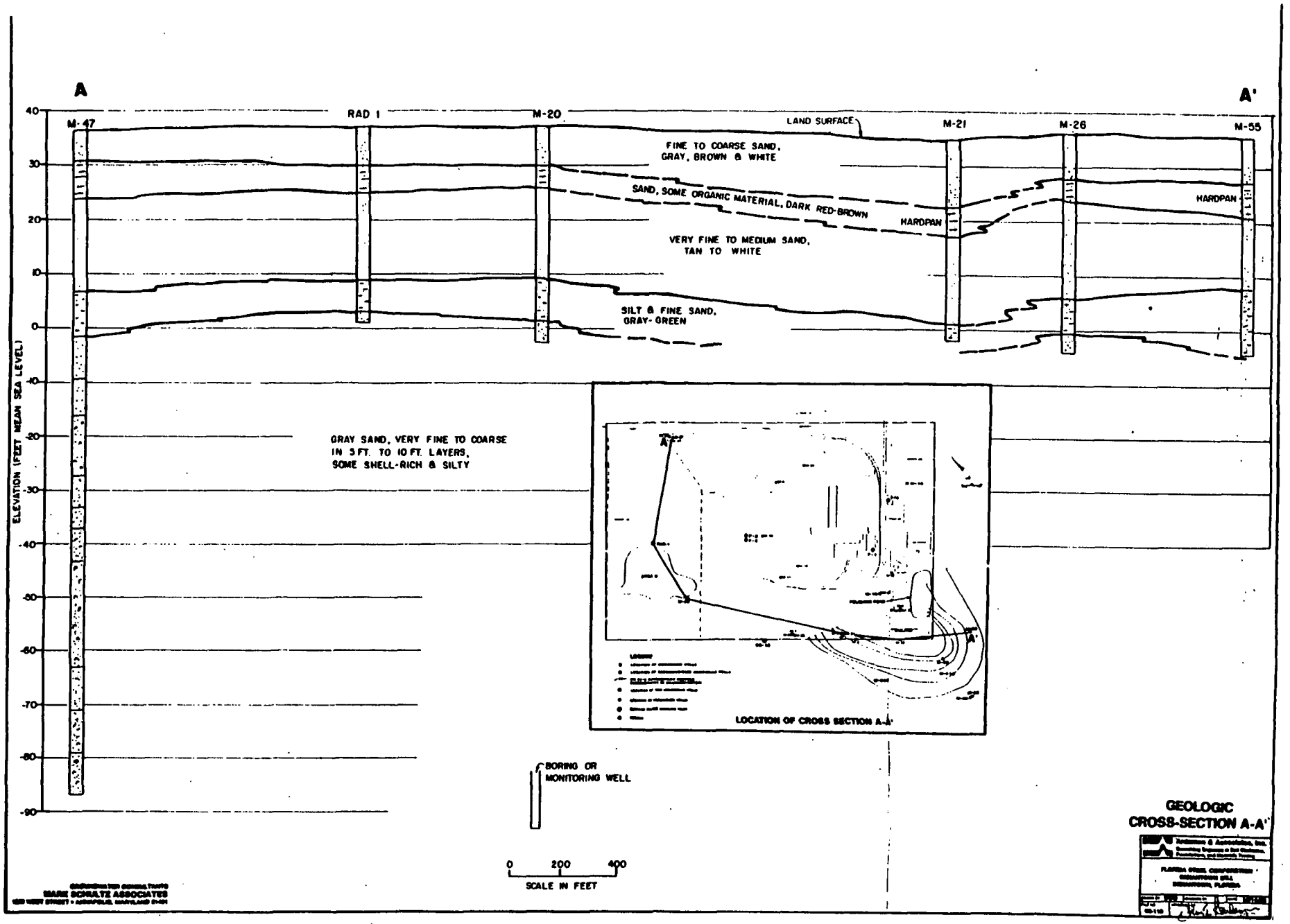
The lithology of the aquifer changes laterally as well as vertically, so that the permeable beds are not always found at the same depth; in fact, in some areas they are missing entirely. The permeable limestone, sandstone, and shell strata are more prevalent in the eastern part of the county than in the western part.

The lithology of the upper portion of the shallow aquifer at the site is shown on the geologic cross-sections on Figures 6 and 7. The locations of the cross-section lines are shown on the figures. The cross-sections indicate consistent geology with fine to coarse sand from land surface to approximately 10 feet, organic-rich sand or hardpan to 15 feet, very fine to fine tan-white sand to 30 feet and gray-green silt to 40 feet. From 40 to 120 feet, the lithology consists of very fine to coarse gray sand in 5- to 10-foot layers, some of which are shell-rich and/or silty.

In the Indiantown area, small diameter open-end wells can be constructed immediately below the hardpan, in permeable sand from 25 to 35 feet below the land surface. Open-end wells can also be developed in shell beds from 95 to 110 feet below the land surface to yield moderate amounts of potable water.

Most of the sand of the Eastern Flatlands area is of low to medium permeability, but sandpoint wells will yield enough water for most domestic needs. Most sandpoint wells are 15 to 45 feet deep and 1.25 to 2 inches in diameter. The nearest wells of such shallow depth are located approximately 1/2 mile south (downgradient) of the FSC Indiantown Mill. The higher capacity wells in the Indiantown area, including the FSC production well are screened from about 100 to 125 feet. The water supply wells for the community of Indiantown, located over two miles southeast of the mill, are also screened in the 100 to 125 foot depth interval.

The water table is an undulating surface conforming in a general way to the topography of the land. Most of Martin County west of the coastal ridge is relatively flat and the water table is close to the land surface.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M-47
RAD 1
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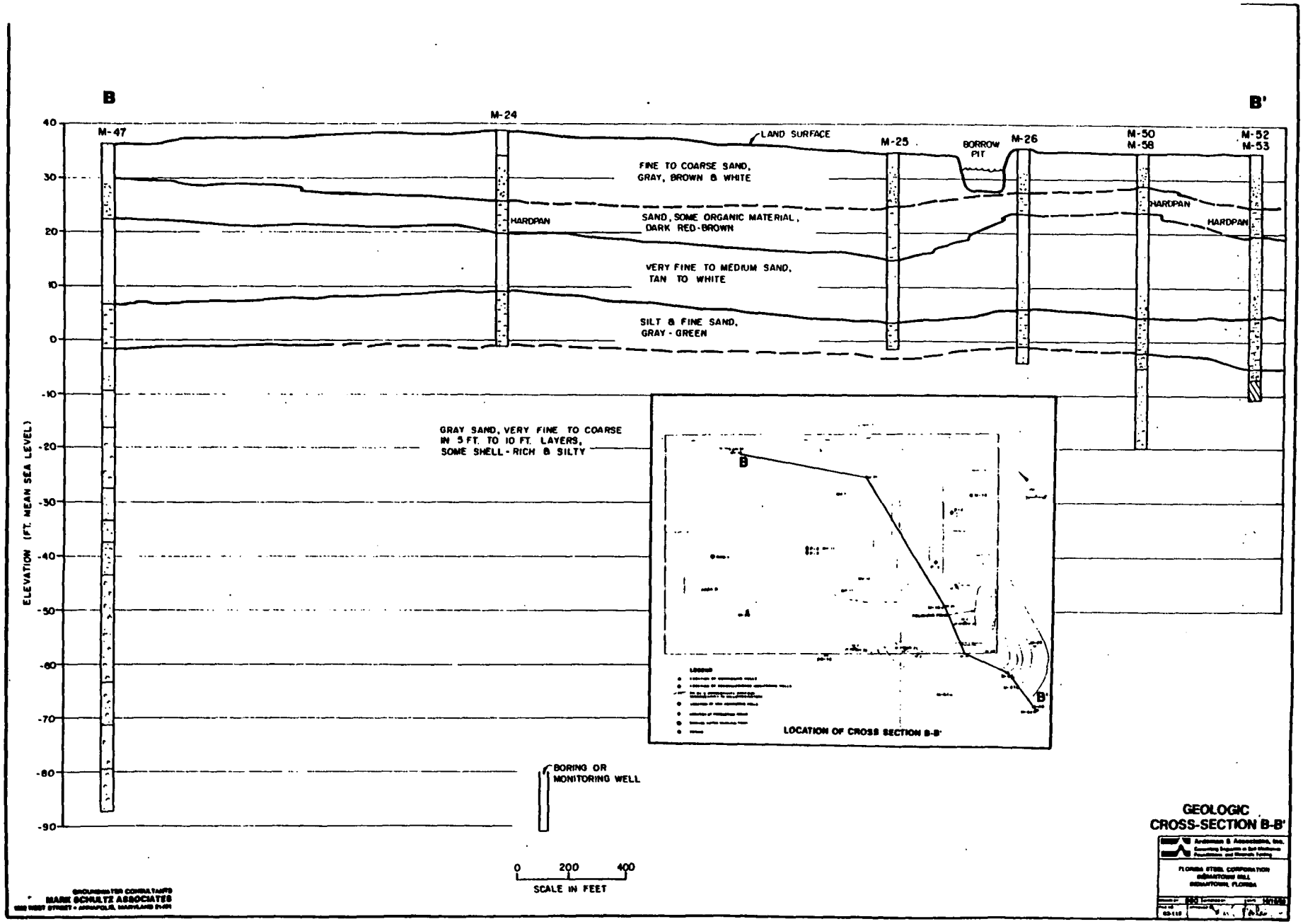
M-21
M-26
M-55
LAND SURFACE
FINE TO COARSE SAND, GRAY, BROWN & WHITE
SAND, SOME ORGANIC MATERIAL, DARK RED-BROWN
HARDPAN
HARDPAN
VERY FINE TO MEDIUM SAND, TAN TO WHITE
SILT & FINE SAND, GRAY-GREEN
GRAY SAND, VERY FINE TO COARSE IN 5 FT. TO 10 FT. LAYERS, SOME SHELL-RICH & SILTY
ELEVATION (FEET MEAN SEA LEVEL)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
LOCATION OF CROSS SECTION A-A'
BORING OR MONITORING WELL
0
200
400
SCALE IN FEET
GEOLOGIC CROSS-SECTION A-A'
MARK SCHULTZ ASSOCIATES

Figure 6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M-52
M-53
LAND SURFACE
BORROW PIT
FINE TO COARSE SAND, GRAY, BROWN & WHITE
SAND, SOME ORGANIC MATERIAL, DARK RED-BROWN
HARDPAN
VERY FINE TO MEDIUM SAND, TAN TO WHITE
SILT & FINE SAND, GRAY - GREEN
GRAY SAND, VERY FINE TO COARSE IN 5 FT. TO 10 FT. LAYERS, SOME SHELL-RICH & SILTY
ELEVATION (FT. MEAN SEA LEVEL)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
LOCATION OF CROSS SECTION B-B'
BORING OR MONITORING WELL
0 200 400
SCALE IN FEET
GEOLOGIC CROSS-SECTION B-B'
MARK SCHULTZ ASSOCIATES

Figure 7

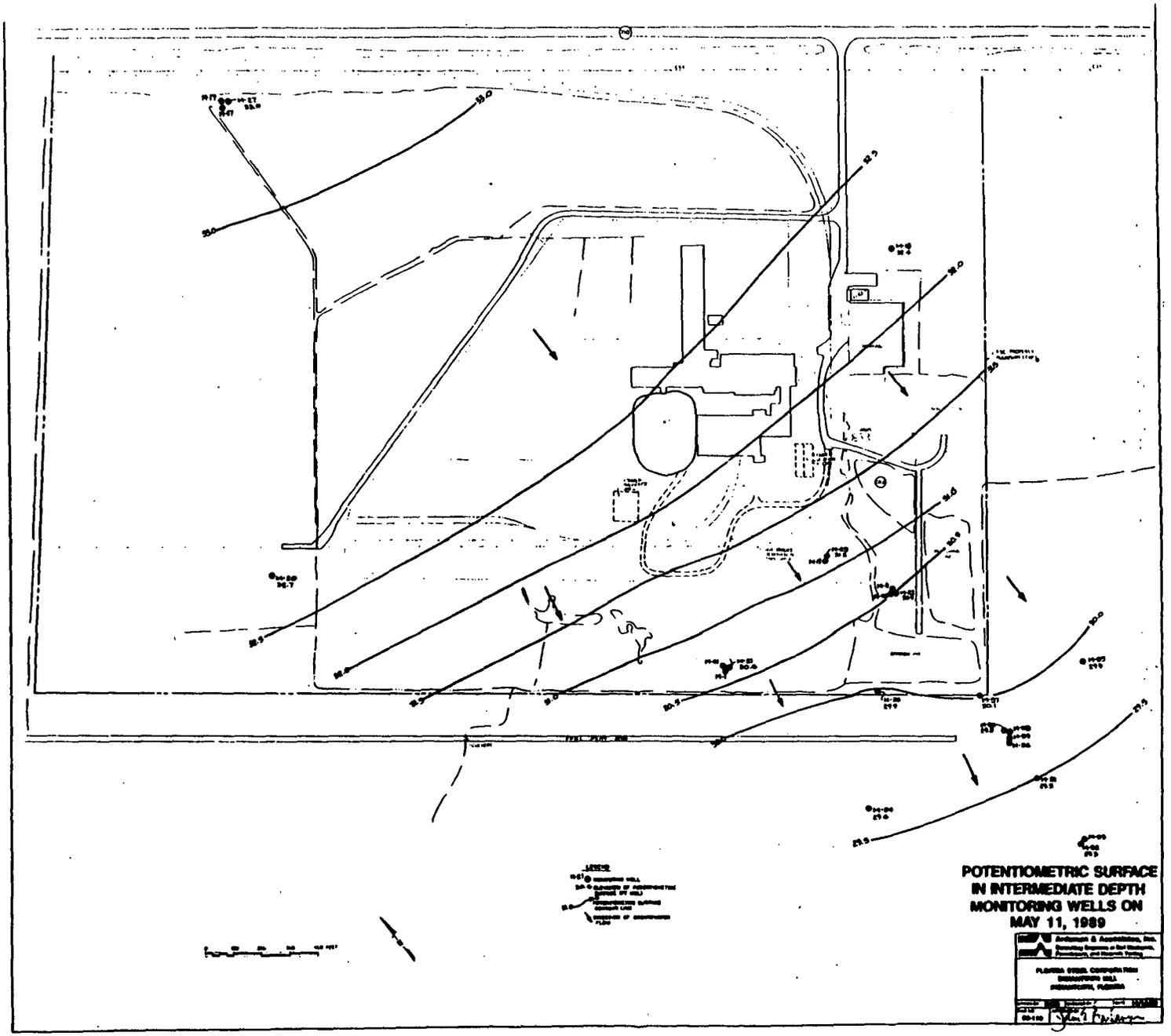

POTENTIOMETRIC SURFACE
IN INTERMEDIATE DEPTH
MONITORING WELLS ON
MAY 11, 1989

Figure 8

Groundwater elevation maps for the shallow aquifer prepared by Earle (1975), confirm the findings of the site investigation, namely that the direction of groundwater flow at the Site is towards the south. The maps prepared by Earle also show that the St. Lucie Canal represents a divide for the shallow aquifer with groundwater flowing toward the canal from both the north and south. A groundwater elevation map for the site is presented in Figure 8. Subsurface drainage is very sluggish owing to the flatness of the terrain.

The shallow aquifer in Martin County receives most of its recharge from rainfall in and immediately adjacent to the county. Most of the county is covered with sand that is sufficiently permeable to absorb practically all 60 inches of annual rainfall. In general, surface water runoff accounts for a minor fraction of the annual precipitation until the water table reaches the ground surface.

Groundwater is discharged by flow into streams, ditches or canals, by direct flow into the ocean, by evapotranspiration, and by pumping from wells. In the central part of the county, where the water table is at or near the surface during most of the year, evapotranspiration is the most important means of discharge.

Groundwater levels decline from about 2 to 5 feet during the dry season in most areas of the county. Seasonal fluctuations observed in monitoring wells at the FSC Indiantown Mill are in this range with the water table generally within 5 feet of land surface.

The artesian aquifer in Martin County is part of the Floridan aquifer, which underlies all of Florida and southern Georgia. Permeable parts of the Avon Park limestone and the Ocala Group comprise the principal producing zones of the Floridan aquifer.

In all parts of Martin County, except at the tops of the high sandhills in the eastern part of the county where the land surface is more than 50 feet above mean sea level, wells penetrating the Floridan aquifer will flow. The top of the Floridan aquifer in Martin County is usually between 600 and 800 feet below the land surface. The thickness of the aquifer is unknown, as no wells have completely penetrated it. The deepest known wells extend 1,300 to 1,500 feet below mean sea level.

The potentiometric surface for the Floridan aquifer in Martin County ranges from 49 to 53 feet above mean sea level. The potentiometric surface generally slopes in an east-southeasterly direction in Martin County; however, local cones of depression caused by relatively large withdrawals can distort the regional pattern.

The piezometric surface is higher than the water table in all parts of Martin County. For this reason, recharge to the Floridan aquifer does not occur in Martin County. Discharge by upward leakage through the confining beds of the Hawthorn formation is probably small in Martin County. The confining bed is composed of more than 500 feet of fine sand, silt and "tough" green clay of extremely low permeability.

Groundwater from the artesian aquifer in the vicinity of Indiantown is somewhat brackish with chloride and total dissolved solids concentrations on the order of 500 to 1,000 mg/l, respectively.

5.2 Hydrology

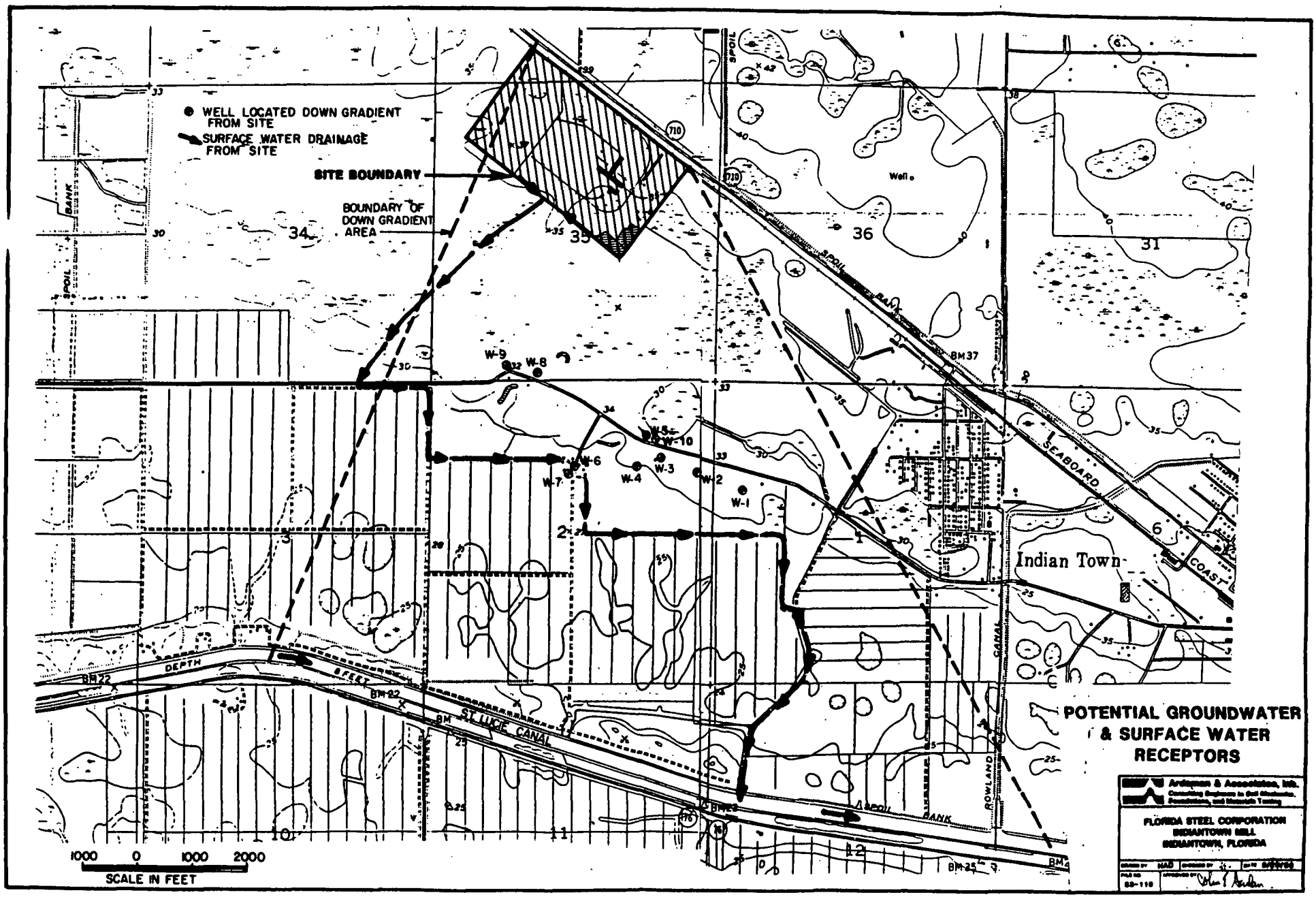
The surficial sands throughout most of central Martin county are sufficiently permeable to absorb practically all 60 inches of annual rainfall; consequently, drainage is chiefly underground. Due to the flatness of the terrain, ponds form throughout most of the region during the rainy season. Surface water flow from the site is intermittent, occurring only during the rainy season. The direction of surface water flow is shown on Figure 9.

The St. Lucie Canal, which is approximately two miles southwest of site at its closest point, is the major channel used for control of water levels in Lake Okeechobee. The canal originates on the east shore of the lake and flows generally northeastward for about 40 miles to the Atlantic Ocean. The upper reaches constitute an engineered canal but the lower channel follows the canalized course of the South Fork of the St. Lucie River.

Indiantown and a large part of Martin County lies within the Indian River Lagoon Drainage Basin. Surface water in the Indiantown area can flow into the channelized St. Lucie Canal which flows into the St. Lucie River at Stuart.

Surface water on the FSC Indiantown Mill property can flow either to the borrow pit/retention pond in the southeast corner of the site or to the ditch along the southwest property line. Since the borrow pit and ditch are connected, water flows from the borrow pit/retention pond to the ditch. There is an opening in the dike for the ditch at approximately the center of the southern property line. Water flowing off-site through this opening flows southwest to the perimeter ditch around the Talquin Corporation orange groves. The perimeter ditch flows east around the groves and discharges into a county ditch which flows south to the St. Lucie canal.

During clean-up of PCBs from the borrow pit/retention pond in 1986, a culvert at the east end of the pond was removed. Prior to its removal, this culvert may have allowed offsite drainage to



POTENTIAL GROUNDWATER & SURFACE WATER RECEPTORS

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

FLORIDA STEEL CORPORATION
INDIANTOWN MILL
INDIANTOWN, FLORIDA

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FILE NO. 85-110 | APPROVED BY

the east during periods of extremely high water. Surface water from the culvert would have flowed north to approximately the middle of the eastern FSC property line and then offsite to the east.

5.3 Soil Contamination

Soil contamination at the site is due to the disposal of EC dust on-site during the plant's operation and leaks of hydraulic fluid containing PCBs. The concentrations of contaminants in soil are presented in Table 1.

EC dust is the fine particulate material generated as the high temperatures in an electric arc furnace drive off and oxidize some of the iron and most of the other volatile metals contained in the scrap. This silt-sized material is a listed hazardous waste and has been given the designation K061 by EPA. Some EC dust is present in the ash resulting from the PCB incineration.

During the period from November 1970 until November 1980, approximately 11,000 dry tons of EC dust were deposited in two on-site disposal areas designated as Area B on Figure 3.

The thickness of the EC dust remaining in the former disposal area to the south of the plant site ranges from 0.75 inches to 18.5 inches and averages 9.6 inches. The line of demarcation between the EC dust and the underlying fine sand is visually distinguishable in extruded samples of the EC dust and underlying soil and is also visually distinguishable in the field.

Once exposed to the elements, EC dust tends to form a hard crust as a result of the cementing reaction between the lime in the dust and moisture from the atmosphere. As a result, the EC dust is less susceptible to erosion by wind and water.

PCB contaminated soil is found in limited areas on the edge of the previous PCB cleanup and a small area west of the slag disposal area.

Metals contaminated sediment is found in drainage ditches including part of the southern border of the site (see Figures 10 and 11).

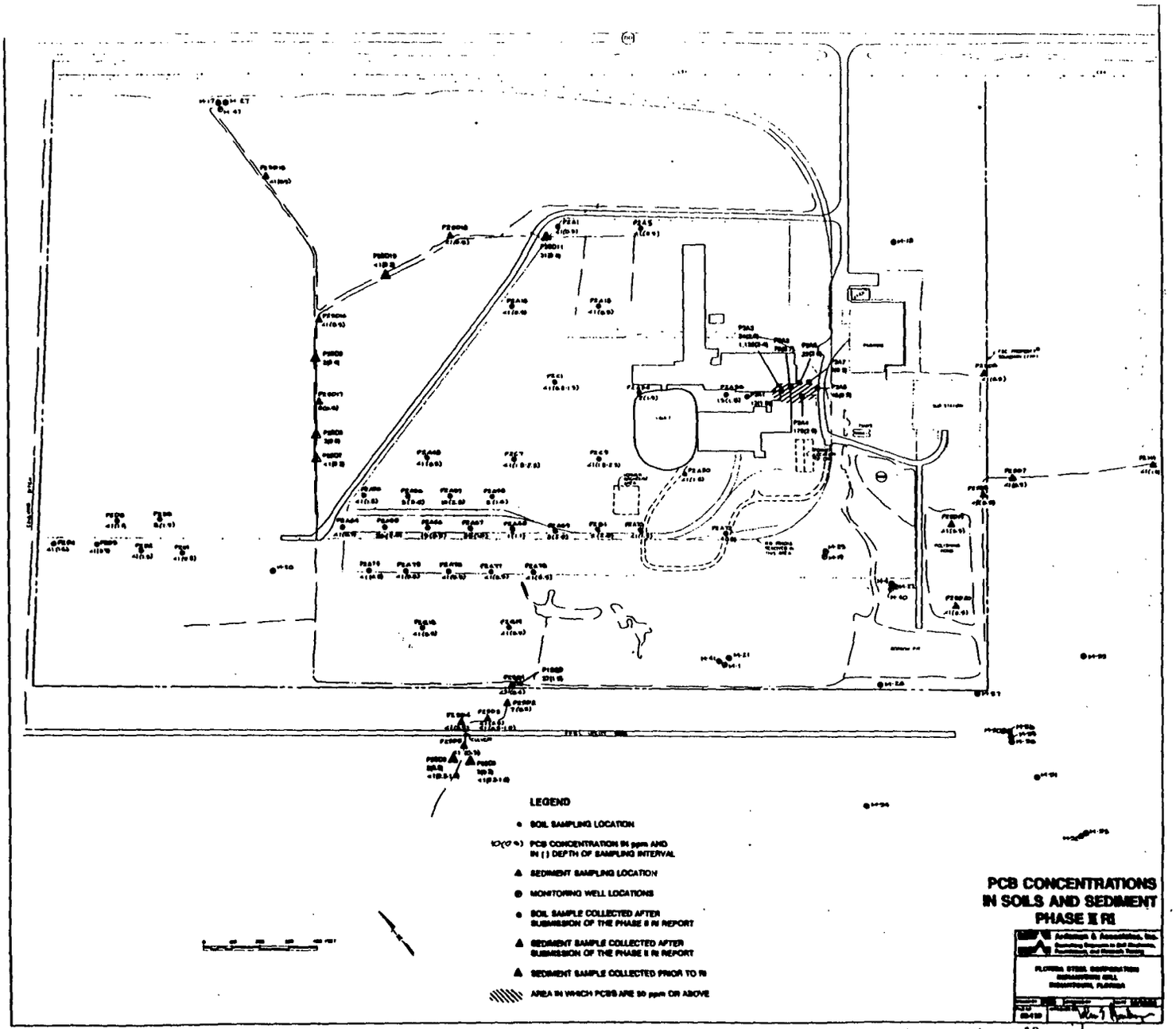
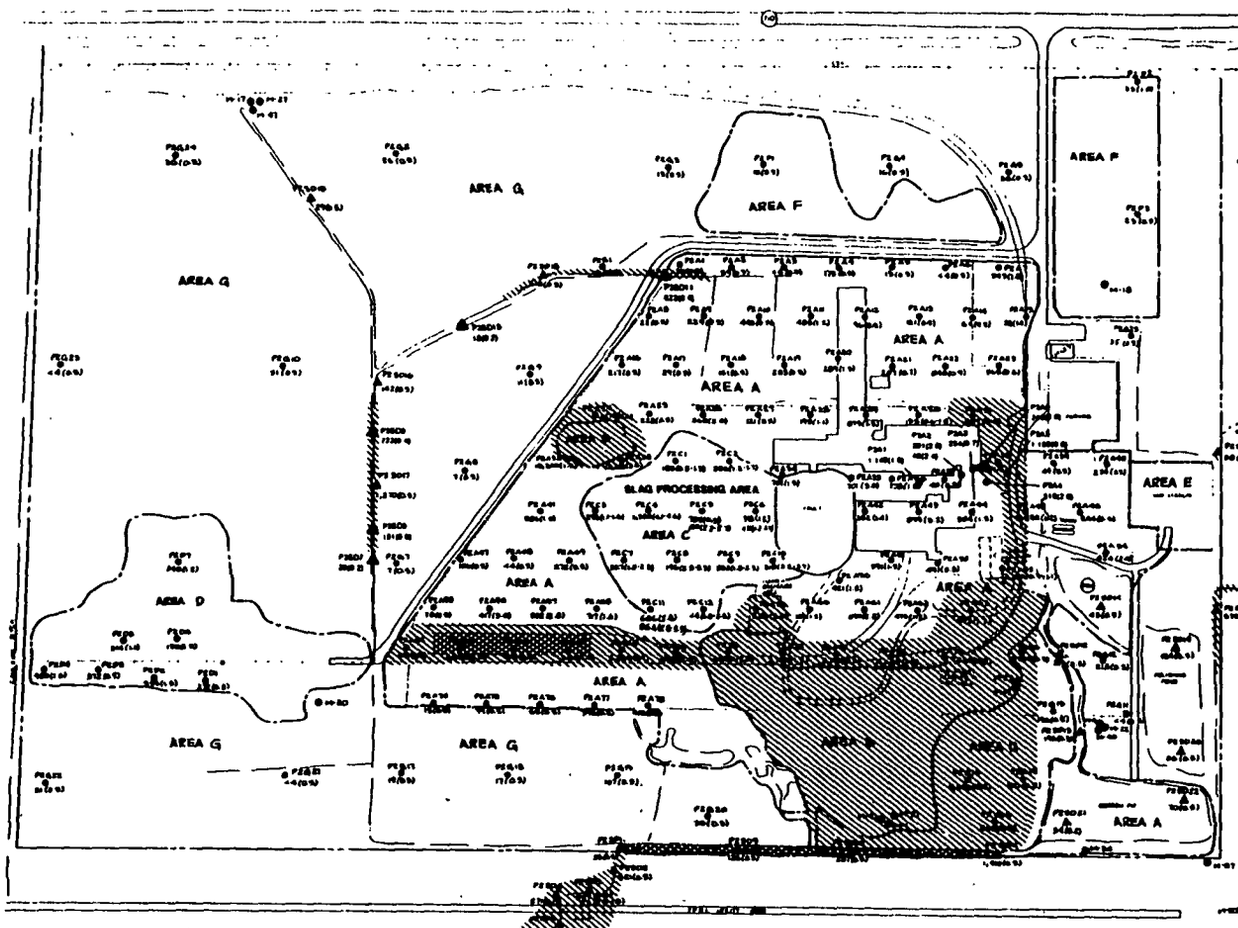

LEGEND
SOIL SAMPLING LOCATION
PCB CONCENTRATION IN ppm AND IN ( ) DEPTH OF SAMPLING INTERVAL
SEDIMENT SAMPLING LOCATION
MONITORING WELL LOCATIONS
SOIL SAMPLE COLLECTED AFTER SUBMISSION OF THE PHASE II RI REPORT
SEDIMENT SAMPLE COLLECTED AFTER SUBMISSION OF THE PHASE II RI REPORT
SEDIMENT SAMPLE COLLECTED PRIOR TO RI
AREA IN WHICH PCBS ARE 50 ppm OR ABOVE
PCB CONCENTRATIONS IN SOILS AND SEDIMENT PHASE II RI

Figure 10



Sampling Location	Description	Total Lead (ppm)	TCLP Lead (mg/L)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

LEGEND

- SOIL SAMPLING LOCATION
- 80(0-1) TOTAL LEAD CONCENTRATIONS IN ppm AND IN ( ) DEPTH OF SAMPLING INTERVAL
- SEDIMENT SAMPLING LOCATION
- MONITORING WELL LOCATION
- SOIL SAMPLE COLLECTED AFTER SUBMISSION OF THE PHASE II RI REPORT
- SEDIMENT SAMPLE COLLECTED AFTER SUBMISSION OF THE PHASE II RI REPORT
- AREAS EXCEEDING LEAD CLEANUP
- AREAS WITH PCB CONCENTRATIONS BETWEEN 25 AND 48 ppm

TOTAL LEAD CONCENTRATIONS IN SOILS AND SEDIMENT PHASE II RI

Ardaman & Associates, Inc.

FLORIDA STEEL CORPORATION
SUMMERTOWN MILL
SUMMERTOWN, FLORIDA

Table 1: Concentrations of contaminants
EC Dust and Soil/Sediment

	range	average
EC Dust (ppm)		
Cadmium	217 - 956	449
Lead	7520 - 27,600	15,384
Zinc	55,200 - 242,000	129,200
Soil/Sediment (ppm)		
Cadmium	2 - 380	82
Lead	4 - 17,000	1,391
Zinc	32 - 110,000	27,922
PCBs	1 - 1,100	37

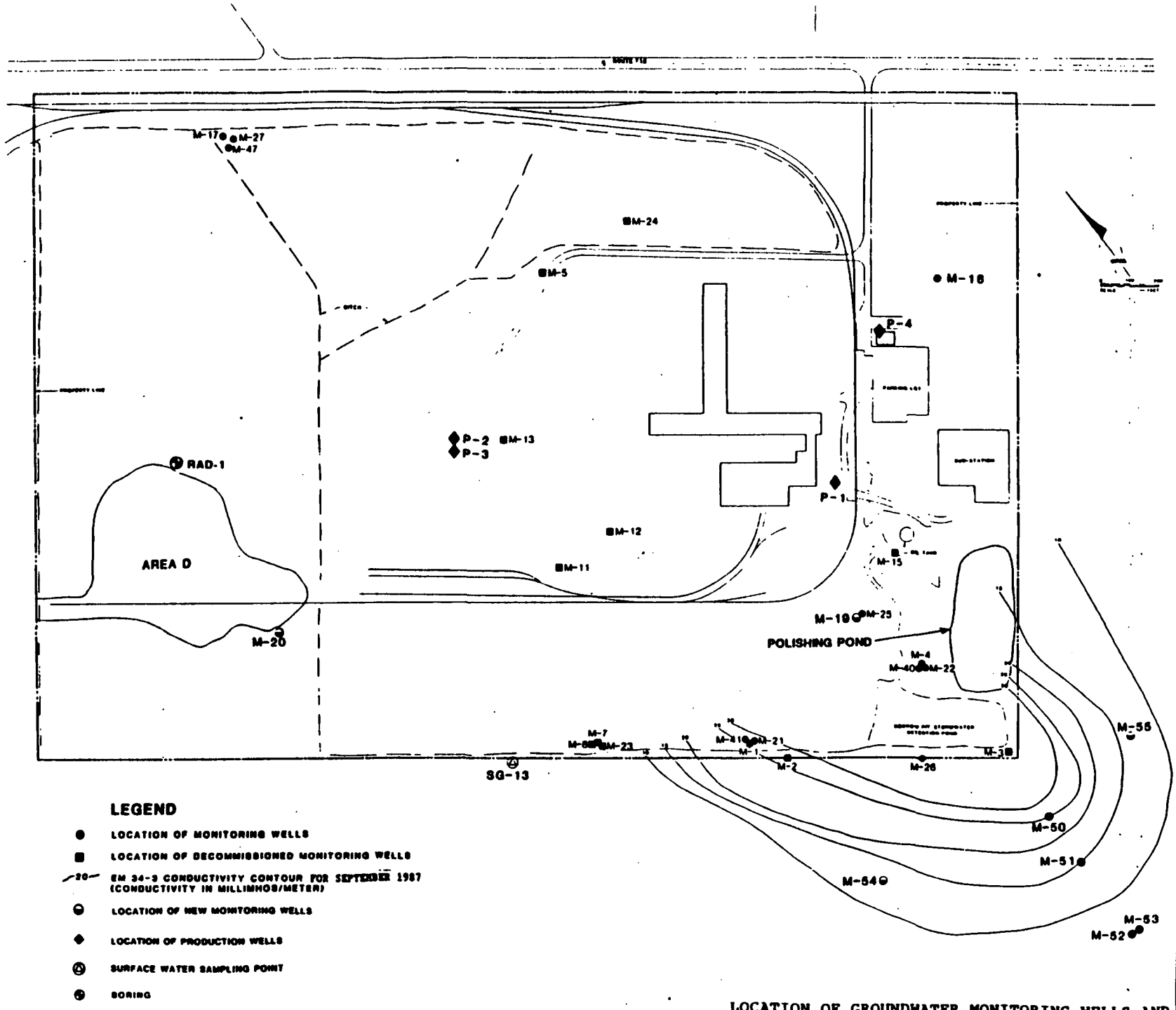
Volume of Contaminants (estimated):

EC dust and soil/sediment contaminated with metals and low level PCBs	26,000 cubic yards
Soil/sediment contaminated with PCBs above 50 ppm	600 cubic yards
PCB incinerator ash contaminated with metals	10,700 cubic yards

5.4 Groundwater Contamination

During the Phase I Remedial Investigation, groundwater samples from two wells were analyzed for the CLP/HSL constituents. The wells were M-50, near the center of the plume, and M-20, downgradient from the scrapyard. The CLP/HSL analyses identified the same contaminants of concern in groundwater for which monitoring has been performed since November 1985. The Consent Agreement of September 1985 between FDER and FSC provided for semi-annual sampling for these parameters until June 1990, at which time samples were collected and analyzed annually. Because PCBs have never been detected in the monitoring wells, analyses for this parameter are presently performed annually. The location of the 24 existing permanent wells are shown on Figure 12.

A groundwater plume extends south from the vicinity of the brine discharge from the plant's former water softener to a distance of approximately 600 feet beyond the southern property line. The plume extends to a depth of approximately 35-40 feet. The extent



LOCATION OF GROUNDWATER MONITORING WELLS AND EM 34 CONDUCTIVITY CONTOURS

of the plume has been defined by analytical data and electromagnetic geophysical surveys. Water quality in the plume is characterized by elevated concentrations of the following parameters:

Table 2: Groundwater contaminant concentrations

Contaminant	Range	Average
Cadmium (ppb)	1 - 38	12
Lead (ppb)	7 - 742	50
Zinc (ppm)	.11 - 13	3.6
Radium 226 (pCi/L)	1 - 91	25
228		3

Estimated volume of contaminated groundwater: 365 million gallons

Several uncertainties exist with regard to the radium detected in the groundwater. Radium-228 was measured in concentrations substantially less than the radium-226. However, its source is uncertain given its short half-life. Another uncertainty is the mechanism that resulted in the elevated radium-226 concentrations in groundwater.

Two related theories may explain the occurrence of elevated radium levels and subsequently high gross alpha levels. First, leaching tests with a sodium chloride solution performed on native soil, EC dust, lime and slag indicate that the presence of dissolved radium in the ground water plume could be a result of the dissolved sodium chloride causing naturally occurring radium to leach from the soil. Secondly, it is possible that naturally occurring radium in the groundwater withdrawn by the former production well was concentrated by cation exchange with the column resin in the water softener.

5.5 Surface Water Contamination

During the Phase I Remedial Investigation, a surface water sample was collected at the only point where the off-site flow from the property intermittently occurs, a drainage ditch on the southwest border of the property. The sample was collected in August because there was no off-site surface water flow when the soil and groundwater samples were collected in May.

Class M surface water standards for zinc and iron were exceeded. Volatile, acid or base neutral extractable organics, pesticides, or PCBs were not detected in the sample.

During Phase II, additional surface water samples were collected from on-site and off-site locations. Lead was detected in one

sample, collected on-site from the "polishing pond." The concentration of lead, 31 ppb, was above existing Florida surface water standards. Other surface water samples, collected from private and county maintained drainage ditches, had lower lead concentrations that decreased to a level of 8 ppb at a point near the St. Lucie Canal.

Zinc exceeded surface water standards in three out of the seven Phase II surface water samples. The highest zinc concentration in the on-site samples was 155 ppb; the highest zinc concentration in off-site surface water samples was 45 ppb.

5.6 Potential Routes of Contaminant Migration

Groundwater is a migration route from the site. Groundwater at depths of approximately 30 feet or more is reportedly used for drinking water at some residences about 1/2 mile from the site.

Metals have been detected in surface water in the borrow pit. However, surface water samples taken from the borrow pit were either at or slightly above existing standards. Metals were detected in surface water in drainage ditches south of the site. The metals concentrations decreased with increasing distance from the site.

Surface water runoff from the contaminated soil at the Site can contain metals and is one migration route from the site. On-site actions are expected to reduce metals concentrations in the runoff.

Runoff from the site does provide some water to seasonal wetlands located south/southwest of the site.

6.0 SUMMARY OF SITE RISKS

CERCLA directs that EPA must protect human health and the environment from current and potential exposure to hazardous substances at Superfund sites. In order to assess the current and potential future risks for the Florida Steel Site, a risk assessment was conducted. This section summarizes the findings concerning the risks from exposure to soil and groundwater at the Site. However, the treatment and disposal of contaminated groundwater will be addressed in the second operable unit for this Site.

6.1 Identification of Contaminants of Concern

At this Site the contaminants of concern in soil are cadmium, chromium, lead, zinc, and PCBs. These contaminants are present in site soils because of the on-site disposal of EC dust and from leaks of hydraulic fluid containing PCBs. The contaminants of concern in groundwater are cadmium, lead, and radium-226 and 228.

The presence of metals in groundwater is due to the leaching of metals from the soil and EC dust; therefore, soil cleanup levels have been developed for the protection of groundwater. The presence of radium in groundwater may be due to the discharge from a water softening system which may have increased leaching from native soils. Table 4 provides the reasonable maximum exposure concentrations for the contaminants of concern.

6.2 Exposure Assessment Summary

Exposure pathways are identified which consist of four elements: 1) a source and mechanism of chemical release to the environment, 2) an environmental transport media (e.g., air, ground water, surface water) for the release chemical, 3) a point of potential human contact with the contaminated medium (referred to as an exposure point), and 4) a human exposure route (e.g., drinking water). Each pathway therefore describes a particular route by which a population or individual may be exposed to contaminants originating from a site. Once the exposure pathways have been identified and adequately described, receptor populations can be identified, exposure point concentrations determined, doses and intakes can be calculated, and any uncertainties can be described.

The potential exposure pathways considered for the FSC site under the no-action scenario for present and future land use are:

1) Dermal contact and ingestion of contaminated soil by industrial workers under current and future use conditions at the site.

2) Non-potable use of groundwater, such as hand washing, for future conditions at the site.

3) Residential drinking water, residential bathing and showering at nearby off-site locations in the future if contaminated groundwater was not treated.

Residential uses of the site were not evaluated in the risk assessment. Deed restrictions on the use of the site have been filed with the Martin County Clerk of Circuit Court. The deed restrictions limit use of the site to mostly industrial or commercial activities. The restrictions are already in effect and will remain in effect regardless of the cleanup activities that occur.

In addition, a coal fired power plant is to be built on adjoining property southwest of the site. A 500-KV electric power line will likely be erected across the western portion of the site. Given these conditions, the existing zoning laws, and the deed restrictions, future residential use of the site is not anticipated.

Exposure to contaminated sediment and surface water was not evaluated because the chance of exposure is very low at the site. The site is located in a relatively isolated area and a fence around the site limits the access of people who pass by.

The nearest downgradient potable well is over 1,400 feet from the plume's boundary and is currently not impacted by the contamination plume. Therefore, exposure to groundwater under current conditions is not quantitatively assessed. No potable or non-potable wells are currently in use on the site and consequently are not assessed under the current use scenario.

With respect to future use, the locations of water supply wells downgradient from the site are shown on Figure 9. Private and commercial downgradient wells are reported to range in depth from 30 to 100 feet below land surface. The nearest well is more than 1,400 feet from the downgradient edge of the contaminated groundwater plume. Groundwater samples were collected from the two domestic wells nearest the site during the June 1987 sampling. One well is reported to be 104 feet deep and the other well is over 100 feet deep. Concentrations of cadmium, chloride, iron, lead, sodium, total dissolved solids, and gross alpha were at background levels in the two domestic wells.

Given an average flow velocity of 40 feet/year and a distance of approximately 1400 feet from the edge of the contaminated groundwater plume to the nearest residential well, it would take about 35 years for the plume to reach the nearest well.

Inhalation of contaminants volatilizing from the surface soil, sediment in drainage ditches or other surface waters is not considered to be significant at the FSC site due to the low volume of the only contaminant, PCBs, which could potentially volatilize.

Air sampling was conducted in the EC dust area on two consecutive days during the Phase I investigation. The sampler was placed immediately downwind of Area B. Wind speed varied from calm to very windy during the 9 hour collection period on May 26, 1988 and varied from calm to breezy during the 12-hour collection period on May 27, 1988. The results of the analyses and the OSHA permissible exposure limits are presented in the following table:

Table 3: Air Sampling Results (units expressed in mg/m^3)

Analyte	May 26, 1988	May 27,1988	8 hr. Occupational Limits
Lead	0.290	0.040	30
Cadmium	0.011	0.002	200
Chromium	0.008	0.003	NA

The groundwater concentrations used in calculations of chemical intakes were based on the 95% upper confidence limit (UCL) of measured concentrations from the wells most strongly influenced by the high total dissolved solids (TDS) plume. Flow from the current plume boundary to potential receptors has been assumed to follow a plug flow pattern with no attenuation or dilution.

Several assumptions and constants used to evaluate the exposure and calculate site risk are presented in Appendix C.

6.3 Toxicity Assessment

To assess the possible toxicological effects from exposure, health effects criteria are derived from a review of health and environmental standards and published toxicological studies.

For risk assessment purposes, individual pollutants are separated into two categories of chemical toxicity, depending on whether they exhibit carcinogenic or noncarcinogenic effects.

Cancer potency factors(CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach make underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that is not likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. Uncertainty factors are used to account for the use of animal data to predict effects on humans. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The applicable RfDs and CPFs are:

RfDs (mg/kg/day)		CPFs (mg/kg/day)-1	
Cadmium	5×10^{-4}	PCBs	7.7
Chromium (III)	1×10^{0}		
Chromium (VI)	5×10^{-3}		
Lead	4.28×10^{-4} **		
Zinc	2×10^{-1}		

**No cancer potency factor or reference dose has been determined by EPA. The reference dose noted above was presented in the risk assessment for comparative purposes only and was derived using EPA's action level of 15 ppb for lead in drinking water.

6.4 Summary of Baseline Risk Characterization

A characterization of risk was performed in the risk assessment to address potential risk and hazards to human health posed by the Site in the absence of remedial action. The risk characterization is based on identifying potential chemicals of concern and developing exposure scenarios for each of the potential and future exposure pathways.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or $1E^{-6}$). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

This risk associated with the various exposure pathways is summarized in Table 4. A range of 95% UCL concentrations in soil and groundwater is often presented because subsections of the site were each evaluated for their contribution to the risk. However, the risk or hazard index values presented in the tables represent a total site risk for each contaminant for each exposure pathway.

Table 4 shows that pathways which indicate the greatest concern are dermal contact and incidental ingestion of soils and future ingestion of the groundwater. The chemicals which drive the risk in the soil related pathways are lead and PCBs. Lead drives the risk in the groundwater pathway.

Cleanup levels were derived for those scenarios which, based on the quantitative risk assessment, may adversely impact the health of exposed individuals. The exposure pathways which were evaluated and determined to pose either potential carcinogenic risks greater than 10^{-6} and/or a hazard index exceeding one are listed below:

1) Dermal contact and ingestion of contaminated soil by industrial workers under current and future use conditions at the site.

2) Ingestion of contaminated water at nearby off-site locations in the future if contaminated groundwater was not treated.

Of the most toxic metals on-site, lead is present in the highest concentrations. In addition, the highest potential risk is associated with ingestion of contaminated groundwater. Therefore, it is appropriate to base the final soil cleanup level upon the soil lead concentration that would be protective of groundwater. The soil lead cleanup level, 600 ppm, was determined to be the level that would ensure that the underlying groundwater would contain no more than 15 ppb of lead, and would thus be protective of future residents drinking groundwater.

Table 4: Summary of Baseline Risk
Current and Future Use Industrial Scenario Noncarcinogenic Risk
Soil Ingestion

Contaminant	Range of 95% UCL Exposure concentrations (ppm)	Range of Chronic Daily Intake Values (mg/kg/day)	Reference Dose (mg/kg/day)	HQ
Cadmium	8 - 482	3.6x10-6/1.1x10-4	5x10-4	.12
Chromium	294 - 1,460	6.9x10-5/1.2x10-4	$1x10^0$	.0007
Lead	43 - 9,760	1.0x10-5/2.3x10-3	4.28x10-4*	6.9
Zinc	4090 - 134,000	9.6x10-4/3.1x10-2	2.0x10-1	.16
TOTAL HAZARD INDEX FOR PATHWAY				7.18

*Reference dose for lead was calculated for comparison purposes only. It is not an approv
EPA reference dose.

Current and Future Use Industrial Scenario Noncarcinogenic Risk
Soil Dermal Contact

Contaminant	Range of 95% UCL Exposure concentrations (ppm)	Range of Chronic Daily Intake Values (mg/kg/day)	Reference Dose (mg/kg/day)	HQ
Cadmium	8 - 482	6.6x10-7/3.9x10-5	1x10-3	.04
Chromium	294 - 1,460	2.3x10-5/1.2x10-4	$1x10^0$	.0002
Lead	43 - 9,760	4.4x10-6/7.8x10-4	4.28x10-4	2.3
Zinc	4090 - 134,000	1.6x10-3/5.3x10-2	2.0x10-1	.05
TOTAL HAZARD INDEX FOR PATHWAY				2.39

Table 4: Summary of Baseline Risk (cont.)
Future Use Industrial Scenario Noncarcinogenic Risk
On-site Dermal Contact with Groundwater (handwashing)

Contaminant	95% UCL Exposure Concentrations (ppm)	Chronic Daily Intake Values (mg/kg/day)	Reference Dose (mg/kg/day)	HQ
Cadmium	20	2.8x10-8	5x10-4	.0001
Lead	80	1.1x10-7	4.28x10-4*	.0003
TOTAL HAZARD INDEX FOR PATHWAY				.0004

Future Ingestion of groundwater by nearby residential adult and child, Noncarcinogenic Risk

Contaminant	95% UCL Exposure Concentrations (ppm)	Chronic Daily Intake Values (mg/kg/day)	Reference Dose (mg/kg/day)	HQ
Child				
Cadmium	20	1.2x10-3	5x10-4	2.4
Lead	80	4.7x10-3	4.28x10-4*	11.0
TOTAL HAZARD INDEX FOR CHILD PATHWAY				13.4
Adult				
Cadmium	20	5.7x10-4	5x10-4	1.1
Lead	80	2.3x10-3	4.28x10-4*	5.4
TOTAL HAZARD INDEX FOR ADULT PATHWAY				6.5
TOTAL HAZARD INDEX FOR PATHWAY				19.9

Table 4: Summary of Baseline Risk (cont.)
Current and Future Use Industrial Scenario Carcinogenic Risk
Soil Ingestion

Contaminant	Range of 95% UCL Exposure concentrations (ppm)	Range of Lifetime Avg. Daily Dose (mg/kg/day)	Cancer Potency Factor (mg/kg/day)-1	Risk
PCB 1248	8.0 - 16	1.2x10-6/3.7x10-6	7.7	3.67x10-5
PCB 1254	.78 - 5.3	1.0x10-7/2.2x10-6	7.7	6.3x10-6
TOTAL RISK FOR PATHWAY				4.3x10-5

Current and Future Use Industrial Scenario Carcinogenic Risk
Dermal Contact with Soil

Contaminant	Range of 95% UCL Exposure concentrations (ppm)	Range of Lifetime Avg. Daily Dose (mg/kg/day)	Cancer Potency Factor (mg/kg/day)-1	Risk
PCB 1248	8.0 - 16	1.9x10-6/3.7x10-6	7.7	6.2x10-5
PCB 1254	.78 - 5.3	1.2x10-6/1.8x10-7	7.7	1.1X10-5
TOTAL RISK FOR PATHWAY				7.3x10-5

Table 4: Summary of Baseline Risk (cont.)
Future Ingestion of Groundwater; Nearby Residential Carcinogenic Risk

Contaminant	Average Exposure Concentrations (pCi/L)	Lifetime Dose (pCi/lifetime)	Cancer Slope Factor (pCi/l)-1	Risk
Radium 226	24.6	538,740	1.0x10-10	6x10-6
Radium 228	2.9	63,510	1.2x10-10	6.5x10-5
TOTAL RISK FOR PATHWAY				7.1x10-5

Current and Future Industrial Scenario Carcinogenic Risk
Dermal contact with groundwater (handwashing)

Contaminant	Average Exposure Concentrations (pCi/L)	Lifetime Dose (pCi/lifetime)	Cancer Slope Factor (pCi/l)-1	Risk
Radium 226	24.6	34.9	1.0x10-10	4.1x10-10
Radium 228	2.9	4.1	1.2x10-10	4.6x10-9
TOTAL RISK FOR PATHWAY				5.0x10-9

Future Use Nearby Residential Carcinogenic Risk
Dermal contact with groundwater (bathing)

Contaminant	Average Exposure Concentrations (pCi/L)	Lifetime Dose (pCi/lifetime)	Cancer Slope Factor (pCi/l)-1	Risk
Radium 226	24.6	1212	1.0x10-10	1.4x10-8
Radium 228	2.9	143	1.2x10-10	1.5x10-7
TOTAL RISK FOR PATHWAY				1.6x10-7

6.5 Environmental Risks

To date, no endangered or threatened species or associated habitats have been identified on-site.

Site contaminants have been detected at low levels in surface water from a retention pond on-site. Fish are present in the pond; ducks and other birds have been seen occasionally at the pond. The pond received some runoff from a portion of the contaminated areas of the site.

Site contaminants have been detected in the sediment and surface water of seasonally flooded wetlands adjacent to the site. On-site cleanup of contaminated soil is expected to reduce the metals levels in surface water runoff and ultimately improve surface water quality in the on-site pond and the off-site wetlands. Sampling will be required to document changes in surface water quality. Contaminated wetland sediment and contaminated groundwater will be evaluated in a second operable unit.

6.6 Risk Uncertainty

There is a generally recognized uncertainty in human risk values developed from experimental data. This is primarily due to the uncertainty of extrapolation in the areas of (1) high to low dose exposure and (2) animal data to values that are protective of human health. The site specific uncertainty is mainly in the degree of accuracy of the exposure assumptions. Most of the exposure assumptions used in this and any risk assessment have not been fully verified. For example, the degree of chemical absorption from the gut or through the skin or the amount of soil contact that may occur is not known with certainty. Generally accepted default values provided in Agency guidance were used when available.

In the presence of such uncertainty, the Agency and the risk assessor have the obligation to make conservative assumptions such that the chance is very small, approaching zero, for the actual health risk to be greater than that determined through the risk assessment process. On the other hand, the process is not intended to yield absurdly conservative risks values that have no basis in reality. That balance was kept in mind in the development of exposure assumptions and pathways and in the interpretation of data and guidance for this baseline risk assessment.

For this site-specific risk assessment, a quantified risk analysis for the trespasser exposure scenario was not conducted. The risk to a trespasser was deemed to be negligible at the Florida Steel Site compared to the risk to current and future workers because it is an industrial site in an isolated area

(that is zoned industrial) and the site is completely fenced. In addition, the risk assessment was first submitted in November 1989 which was prior to the release of EPA's present guidance which recommends that this pathway be quantified in the risk assessment.

6.7 Risk Conclusion

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

The exposures that are of greatest concern are dermal contact and incidental ingestion of soils and future ingestion of the groundwater. The chemicals which drive the risk for the soil related exposures are lead and PCBs. Lead drives the risk for the groundwater exposure.

7.0 SUMMARY OF ALTERNATIVES

The remedial alternatives developed in the FS report for this site are divided into two groups: 1) treatment for PCB contaminated soils and sediment; and 2) treatment for EC dust and metal contaminated soils or sediment. This section of the ROD presents a summary of each of the alternatives.

ALTERNATIVES FOR PCB CONTAMINATED SOIL

Alternative 1-P: No Action
Capital Costs: $ None
O&M Costs: None
Total Present Worth: None

The Superfund program requires the "No Action" Alternative to be evaluated at every site to serve as a baseline for comparison with the other alternatives. Under this alternative, no further action would be taken to minimize the impact of site contaminants.

Alternative 2-P: Excavation, Off-site disposal; On-site Solidification/disposal
Capital Costs: $ 306,750
O&M Costs: None
Total Present Worth: $ 306,750
Time to Complete: Six months

Under this alternative, PCB contaminated soils would be addressed by two different methods. For soil with PCB levels greater than 50 ppm, the soil would be excavated and shipped off-site to a

RCRA/TSCA approved disposal facility. For soil with PCB levels between 25 and 50 ppm, the contaminated soil would be solidified and placed in the on-site landfill with the metal contaminated soil. Excavation would continue until the cleanup goals are met or the water table is encountered. The excavated areas would be graded and grassed.

The soil with PCB concentrations above 50 ppm also contains metals. Any necessary treatment will be dependent upon the chosen disposal facility. Treatment is not expected to significantly increase overall site cleanup costs because of the small estimated volume of affected soil (600 cubic yards).

ALTERNATIVES FOR EC DUST, LEAD CONTAMINATED SOIL, SEDIMENT, AND ASH

Alternative 1-S: No Action
Capital Costs: $12,000
O&M Costs: $25,000/year for 30 years
Total Present Worth: $345,000

No further action would be taken to minimize the impact of site contaminants. Monitoring of air and groundwater quality would be conducted for up to 30 years to document changing site conditions.

Alternative 2-S: Excavation, Off-site Treatment and Disposal
Capital Costs: $20,990,000
O&M Costs: $12,800/year for 30 years
Total Present Worth: $21,160,000
Time to complete: 15 months

This alternative involves excavation of residual EC dust, soil with lead levels above 600 ppm, and slag with total lead levels above 1360 ppm or above the Toxicity Characteristic Leaching Procedure (TCLP) standards noted on page 38. The lead level of 1360 ppm was derived in the risk assessment as an allowable value for direct contact in an industrial setting. In addition, incinerator ash would be removed from its current location in a covered building on-site. All material described above would be shipped to an EPA approved High Temperature Metal Recovery facility for treatment and disposal. This process heats the contaminated material to a temperature high enough to volatilize the individual metals which are collected in baghouses. Zinc can usually be collected in sufficient quantities for recycling.

The excavated area would be graded and grassed. Surface water runoff from the site would be retained on-site until remedial activities were complete and surface water quality was sufficient to allow a flow offsite. Groundwater quality would be monitored for up to 30 years.

Alternative 3-S: Excavation, On-site solidification and disposal in an on-site Double Lined RCRA Landfill with RCRA cap
Capital Costs:$6,456,000
O&M Costs: $18,200/year for 30 years
Total Present Worth: $6,698,000
Time to Complete: 12 months

This alternative involves excavation of residual EC dust, soil with lead levels above 600 ppm, and slag with total lead levels above 1360 ppm or above the TCLP standards noted on page 38. No excavation below the water table would occur. In addition, incinerator ash would be removed from its current location, a covered building on-site. The material would then be treated on-site by solidification. Solidification involves mixing the contaminated material to achieve a hardened mass. The hardened mass reduces the mobility of the contaminants. Compliance with RCRA Land Disposal Restriction (LDR) treatment standards for EC dust, which is the listed RCRA waste K061, would be achieved by meeting levels specified in the treatability variance for contaminated soil and debris.

The solidified material would be placed in an on-site RCRA landfill with double liners and a leachate collection system and covered with a RCRA cap. The base may be constructed from slag that passes the cleanup goals specified for slag. Such a base would elevate the solidified material above the surrounding land surface, thus increasing the distance between the water table and solidified material. The base would not substitute as bottom liner of the landfill unless it met the requirements for bottom liners found at 40 C.F.R 264.301 (c).

The excavated area would be graded and grassed. Surface water runoff from the site would be controlled and routed to the stormwater retention pond on-site until remedial activities were complete and surface water quality was sufficient to allow a flow offsite. Groundwater quality would be monitored for up to 30 years.

Alternative 4-S: Excavation, Solidification
Solidification, On-site Disposal in Single Lined Landfill with RCRA Cap
Capital Costs: $5,856,000
O&M Costs: $18,200/year for 30 years
Total Present Worth: $6,098,000
Time to complete: 9 months

This alternative is similar to alternative 3-S except for differing landfill design requirements. Under this alternative, the landfill would have only one liner and would not have a leachate collection system. The landfill would be covered with a RCRA cap.

For each alternative considered for metals contaminated material at this site, all visually distinguishable EC dust remaining at the site would be excavated and treated. Soil contaminated with lead above 600 ppm would also be excavated and treated. Also, drainage ditch sediments with lead levels above 600 ppm would be excavated and treated.

Zinc, the most common metal contaminant at the site, is generally present at levels 8 times higher than lead. Therefore, based on the lead cleanup goal of 600 ppm, the zinc cleanup level would be approximately 4800 ppm. For comparison, an estimated acceptable soil zinc level in a residential setting would be approximately 50,000 ppm (EPA Risk Assessment Guidance for Superfund).

For the alternatives involving on-site treatment of metal contaminated material, compliance with the LDR treatment levels specified for EC dust, which is a RCRA listed waste K061, would be achieved by meeting the standards specified in the treatability variance for contaminated soil and debris. A comparison of the treatability variance levels for contaminated soil and debris (EPA 9347.3-06FS, 09-90) and the LDR levels for low zinc EC dust is presented below:

Table 5: Treatment Levels for K061 Wastes (in mg/l TCLP extract)

	Treatability Variance Levels	LDR treatment standards
Cadmium	.2 - 2	.14
Chromium	.5 - 6	5.2
Lead	.1 - 3	.24
Nickel	.5 - 1	.32

Cleanup standards for slag are the TCLP standards for substances listed in RCRA Section 261.24, Table 1 and a total lead level no greater than 1360 ppm. The applicable TCLP standards for slag include, but are not limited to:

Cadmium	1 mg/l
Chromium	5 mg/l
Lead	5 mg/l
Silver	5 mg/l

Given the TCLP values presented in the FS, the leachability of slag is expected to be very low. TCLP values ranged from less than .5 mg/l to 1.3 mg/l of lead for slag samples containing total lead concentrations of 545 to 758 ppm.

The single lined landfill was originally presented in the FS as an appropriate option. However, it has since been determined that a facility specific delisting for the stabilized K061 would be required in order for the waste to be disposed of in a landfill meeting subtitle D design requirements.

The cleanup standard for PCB contaminated soil is based on the TSCA Spill Cleanup Policy for areas with restricted access. The standard, 25 ppm, does not apply to those areas previously cleaned to a level of 50 ppm.

Some bench scale testing has been performed on varying mixtures of EC dust, soil, and cement to evaluate the effectiveness of solidification. These initial results were presented in the Phase II RI Report. As part of the testing, unconfined compressive strength, permeability and EP toxicity were measured. 8 out of 12 samples of "pure" EC dust mixed with varying amounts of cement yielded EP toxicity values less than 3 mg/l. Additional treatability testing will be required to refine the mix of ingredients that will ensure that the solidified material will meet the TCLP standards noted in the treatability variance for contaminated soil and debris and in Table 5.

Additional standards for the solidified material will be developed during the remedial design. These standards may include:
- permeability less than or equal to 10^{-6} cm/sec
- unconfined compressive strength
- satisfactory performance during the American Nuclear Society (A.N.S.) 16.1 leach test procedure.

Another factor that will be evaluated during the treatability study will be the potential for volatilization of PCBs during the solidification process. Soil containing PCBs between 25 and 49 ppm will be solidified and disposed of in the on-site landfill.

Groundwater use restrictions may be needed to prevent disturbances of the off-site groundwater plume until the groundwater cleanup is completed. Possible disturbances may include the installation of water supply wells or excavation below the water table.

8.0 COMPARATIVE ANALYSIS

The alternatives are evaluated against one another by using the following nine criteria:

- Overall protection of human health and the environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): meeting requirements of other laws that relate to the actions proposed for the site.

- Long term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short term effectiveness
- Implementability: being technically and administratively possible
- Costs
- State Acceptance
- Community Acceptance

Overall Protection: The "No Action" alternative, would not protect human health and the environment and will not be evaluated further in the selection of cleanup alternatives.

The remaining alternatives would provide protection of human health and the environment by utilizing treatment to minimize or control the risk associated with exposure to Site contamination. Alternative 2-P would greatly reduce the risk of dermal contact and ingestion of PCB contaminated soil.

Alternative 3-S would greatly reduce the risk of dermal contact and ingestion of metal contaminated soil, including EC dust, by solidifying the waste and disposing it in an on-site landfill. The landfill design would provide a high degree of protection for groundwater.

Compliance with ARARS: The alternatives considered for the site would meet their respective applicable or relevant and appropriate requirements (ARARs) of Federal and State environmental laws or justify a variance from those laws.

As part of alternatives 3-S and 4-S (EC dust and metal contaminated soil), compliance with the RCRA LDR treatment standards for the EC dust (RCRA listed waste K061) would be achieved by meeting the treatment levels specified in the treatability variance for contaminated soil and debris.

Long term effectiveness and permanence: All remedial alternatives considered, except the no-action alternative, offer long term effectiveness and permanence. Alternative 2-S, off-site treatment of the EC dust and lead contaminated soil, represents an effective method to reduce the risk associated with that material. The metals in the EC dust and lead contaminated soil would be separated by the HTMR process and recycled.

Alternative 3-S and 4-S, solidification of EC dust and metals contaminated soil, is an effective and permanent method of reducing the risk associated with the EC dust and metals contaminated soil and ash because the contaminants are permanently bound in a cement matrix.
These alternatives would also serve to limit, to the extent practicable, the source of metals contamination in the

groundwater. Alternative 3-S, solidification and disposal in the on-site RCRA double lined landfill, provides an extra measure of protection for groundwater.

Alternative 2-P, off-site disposal of soil containing greater than 50 ppm of PCBs would offer protection by proper disposal in a permitted hazardous waste facility. Solidification of the low level PCB contaminated soil is an effective and permanent treatment method for the remediation of the Florida Steel Site.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Use of HTMR, as described in Alternative 2-S, will greatly reduce the toxicity of EC dust and lead contaminated soil. Alternative 3-S, solidification of the EC dust, lead contaminated soil and ash will increase the volume of material that would be placed in the on-site vault. However, mobility of the metals will be greatly reduced because they will be permanently bound up in a cement matrix.

Alternative 2-P includes off-site disposal of high levels of PCB contaminated soils and on-site solidification of low level contamination. Off-site disposal of PCB contaminated soil will indirectly reduce the mobility of the contaminants by isolating the material in a secure landfill, thus reducing the forces which drive mobility. On-site solidification of the lower level contaminated soil would increase the volume of the material to be placed in the on-site vault, but the mobility would be substantially reduced by the cement matrix.

Short-term effectiveness: After implementation, all of the soil and ash alternatives, 2-S, 3-S, 4-S, and 2-P, will remove the risk associated with direct exposure to the contaminated material. However, cleanup workers could experience a short term risk due to direct contact, inhalation, or ingestion during excavation and movement of the soil, ash, and EC dust. Airborne emissions of dust will be monitored and controlled to minimize exposure off-site.

Alternative 2-S, HTMR, is not as effective in the short term because of the possibility of traffic accidents with trucks hauling EC dust and metal contaminated material off-site. In addition, the capacity of HTMR facilities is not certain; costs and time required for cleanup could increase depending on capacity of the HTMR facilities. For these reason, HTMR may have a reduced implementability.

Implementability: Alternative 2-S (off-site disposal of EC dust and metal contaminated soil and ash) will take longer to implement since it is dependent upon the rate at which the off-site treatment facility can accept the materials. Alternatives 3-S and 4-S (solidification of EC dust and metal contaminated soil and ash) could be implemented more quickly.

Alternative 2-P (off-site disposal/on-site solidification for PCB contaminated soil) would not be difficult to implement. The volume of soil involved is relatively small so the disposal facility should be able to quickly accept the material. The solidification of low level PCBs is an established technology and is implementable.

Costs: The estimated total present worth costs of each remedy is discussed in this section. The cost associated with Alternative 1-S, the no action alternative for lead contaminated soils is $345,000. The cost for Alternative 2-S is $21,160,000. The cost for Alternative 3-S is $6,698,000. The cost for Alternative 4-S is $6,098,000. The cost for Alternative 1-P, the no-action alternative for PCB contaminated soil, is zero. The cost for Alternative 2-P is $306,750.

The action alternatives have substantially higher costs due to increased efforts to permanently treat the contamination present in the soil and groundwater. This includes on-site solidification of the EC dust and metals contaminated soil and ash (Alternative 4-S), off-site disposal of PCB contaminated soil with concentrations above 50 ppm, and on-site solidification of PCB contaminated soil with concentrations between 25 and 50 ppm (Alternative 2-P).

State Acceptance: The State of Florida has concurred with this Record of Decision.

Community Acceptance: The Martin County Board of Commissioners and local citizens agree that site remediation is necessary; however they are currently opposed to a possible discharge of treated groundwater to the St. Lucie Canal as was stated in EPA's Proposed Plan (see Section 11 - Explanation of Significant Changes).

9.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comment, EPA has selected the following remedy for the site:

- Excavation and off-site disposal at an EPA approved facility of approximately 600 cubic yards of soil contaminated with PCB levels equal to or greater than 50 ppm.

- Excavation and on-site solidification of approximately 37,000 cubic yards of the following:
  - -EC dust and metals contaminated soil and ash. All EC dust and ash would be excavated and treated; soil containing lead above 600 ppm would be excavated and treated.
  - -soil containing PCB levels between 25 and 50 ppm;

No excavation below the water table will occur unless the water treatment system anticipated for the second operable unit is operational. However, at this time it is not anticipated that excavation below the water table will be required.

•Control of surface water runoff from the site during remediation of on-site soils.

•Compliance with Resource Conservation and Recovery Act (RCRA) Land Disposal Restriction treatment standards for EC dust, which is a listed RCRA waste, K061, by meeting levels specified in the treatability variance for contaminated soil and debris.

•Disposal, in an on-site double lined RCRA landfill with a RCRA cap, of all solidified material. The landfill would meet the provisions of 40 C.F.R. Subpart N landfill requirements and would be built above the water table.

•Periodic monitoring of surface water and groundwater quality. The quality of surface water runoff should be consistent with possible future criteria developed for the adjacent wetlands in the second operable unit for this site. Groundwater quality would be monitored for up to 30 years.

Appropriate dust control measures shall be used to reduce the potential for airborne transport of site contaminants during the remedial action, especially during the excavation of EC dust and contaminated soil. Similar steps will also be taken during removal of the incinerator ash for solidification.

PCB contaminated soils that are excavated and temporarily stored on-site pending final treatment and/or disposal must be stored in a manner that will prevent the PCBs from being carried away in surface water runoff. For example, stockpiled soil should be covered with tarps or be contained within berms. In addition, any temporary storage of PCB contaminated soils may be subject to TSCA requirements limiting storage to 30 days or less.

Groundwater monitoring will be performed to ensure that soil lead cleanup levels and the proposed landfill measures will remain protective of groundwater. However, if suggested by results of the monitoring, additional site cleanup may be necessary. This additional site cleanup may include, but not be limited to, additional soil excavation and treatment, modifications to the landfill cover, etc.

As part of the remedial action, all surface water runoff will be controlled and routed to the on-site surface water retention pond. Surface water samples will be collected and analyzed for the site contaminants. The control of surface water runoff and analysis of surface water samples may continue for at least two years after all on-site construction has been completed. This

should allow time to determine the effect of controlling the source of metals contamination upon surface water quality.

The total present value cost of the selected remedy is approximately $7 million dollars. For the EC dust and contaminated soil, this cost includes O&M costs of $18,200/year for up to 30 years. The volume of soil that would be treated under the selected remedy would be approximately 37,600 cubic yards.

9.1 Remediation goals

Based on the results of the RI/ FS reports and the risk assessment, remediation levels were developed that would be protective of human health and the environment. These levels form the basis for the remedial activity to be taken at this site.

EPA and FDER derived a soil lead cleanup level of 600 ppm. This value is based upon the leachability of lead from soil into the underlying groundwater and is a level calculated to be protective of groundwater. EPA's recommended cleanup level for lead in groundwater, 15 ppb, was used as the basis for the derivation of this lead soil cleanup level.

This value was calculated by first determining an average soil lead concentration and an average groundwater lead concentration for an area of the site where a cause and effect relationship could be established. In addition, EPA arrived at a similar cleanup value for lead in soil by using the Summers model and site specific parameters.

Slag, which contains lead, will be cleaned up to 1360 ppm, a level protective of human health in an industrial setting. Slag may not be subject to the cleanup level based on groundwater protection because it produces low levels of lead in leachate and is not a threat to groundwater for levels below 1360 ppm. Toxicity Characteristic Leaching Procedure (TCLP) results are included in the FS (see also Section 5.1 of ROD). However, additional TCLP testing will be conducted during the remedial design.

Some treatment of the soil containing PCBs above 50 ppm may be necessary before disposal in the offsite RCRA/TSCA approved landfill. Some of the PCB contaminated soil contains elevated levels of metals. The disposal facility will be responsible for ensuring that the PCB and metal contaminated soil is disposed of in accordance with appropriate regulations. Treatment and disposal costs of these soils are not expected to significantly increase because of the limited volume (600 cubic yards) of affected soil.

The PCB cleanup level of 25 ppm is based on the regulations referred to in the Toxic Substances Control Act PCB Spill Cleanup Policy for areas with restricted access.

10.0 STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that, when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy, including solidification of EC dust, metals contaminated soil and ash, and soil with PCB concentrations between 25 ppm and 50 ppm will eliminate the source of contamination. The selected remedy will also greatly reduce the threat of dermal contact with contaminated soil.

Excavation and proper off-site disposal of soil with PCB concentrations above 50 ppm will also greatly reduce the threat of dermal contact with contaminated soil.

Eliminating the source of contamination will result in improved surface water quality thereby reducing the amount of contamination that could be carried away in site runoff. In addition, the metals that could leach into the groundwater will be removed.

10.2 Compliance with ARARs

The select remedy will meet the following ARARs:

Resource Conversation and Recovery Act (RCRA)

- Compliance with federal RCRA LDRs for RCRA listed waste K061 (EC dust) will be achieved by meeting treatment levels specified in the treatability variance for contaminated soil

and debris. The treatment standards are listed in Table 5 on page 38.

- 40 C.F.R. Part 261 Subpart C: Characteristics of Hazardous Waste

The preliminary TCLP results for slag presented in the FS indicate that slag does not exhibit the characteristic of toxicity. Additional TCLP sampling will be conducted as part of the remedial design.

- 40 C.F.R. Part 264 Subpart N: Landfill Requirements

- 40 C.F.R. Part 268 Subpart C: Prohibitions on Land Disposal

- 40 C.F.R. Part 268 Subpart D: Treatment Standards

EC dust is a listed RCRA waste, K061. According to the LDRs, a listed waste must be treated to its specific treatment standards before disposal. At this site, the EC dust is considered "low zinc." Five samples of EC dust were analyzed during the RI. The average zinc concentration was 129,320 ppm or 12.9% zinc. Standard deviation was 70,000 ppm.

As noted previously, compliance with the LDR treatment levels specified for EC dust, which is a RCRA listed waste K061, would be achieved by meeting the standards specified in the treatability variance for contaminated soil and debris (OSWER 9347.3-06FS, 09/90).

Placement, as defined in the RCRA LDRs, will occur as part of the on-site actions. However, the material will be treated to the levels specified in the variance before its disposal in the on-site landfill.

Toxic Substances Control Act (TSCA)

- 40 C.F.R. Part 761 Subpart D: Storage and Disposal of PCBs

- 40 C.F.R. Part 761 Subpart G: PCB Spill Cleanup Policy

- 40 C.F.R. Part 761 Subpart K: PCB Disposal Record Keeping

Other:

- Federal Occupational Safety and Health Administration Act (OSHA): The selected remedial action contractor will develop and implement a health and safety program for its workers. All on-site workers will meet the minimum training and medical monitoring requirements outline in 40 CFR 1910.

- National Ambient Air Quality Standards (NAAQS)

- Florida Department of Environmental Regulations - Class III Surface Water Quality Standards

To Be Considered (TBC):

- 06/21/90 OSWER recommendation: a protective cleanup level for lead in water of 15 ppb.

10.3 Cost effectiveness:

The selected remedy has an estimated total present worth of approximately $7 million dollars. The selected remedy affords overall effectiveness proportional to its costs. When the relationship between cost and overall effectiveness of the selected remedy is viewed in light of the relationship between cost and overall effectiveness of the other alternatives, the selected remedy is cost effective.

Capital costs:

-Disposal of soil contaminated with PCBs > 50 ppm:		$306,750
-Solidification of EC dust, metal contaminated material, and soils with PCB levels between 25 and 50 ppm	:	$6,456,500
O&M costs per year (for up to 30 years)	:	$18,200

EC dust and metal contaminated material represent the largest volume of site contaminants and the a source for continuing groundwater contamination. Solidification and disposal of this material in an on-site RCRA landfill is an effective method to address the principal source of contamination.

10.4 Utilization of Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy provides the best balance among the nine evaluation criteria for the alternatives evaluated. The remedy uses permanent solutions and treatment technologies to the maximum extent practicable. The EC dust, soil, and groundwater remedy provides short and long term protection for human health and the environment, is readily implementable, is cost effective and is consistent with future response actions that may be undertaken at the site.

10.5 Statutory Preference for Treatment as a Principal Element

The statutory preference for treatment of soil contamination will be met at this site. The principal threat at this site is ingestion and dermal contact with contaminated soil and the future migration of contaminants from soil into groundwater. The selected remedy will use treatment for the metal contaminated material (EC dust, soil, ash), which represents the largest source of contamination. Treatment of the metal contaminated material will greatly reduce the risk associated with ingestion and contact with contaminated soil, sediment, and ash and will remove the source of future groundwater contamination.

On-site treatment of soil with PCB concentrations above 50 ppm was not considered worthwhile because of the small volume of contaminated media relative to the high costs of effective technologies. However, some treatment may be required before disposal in the RCRA/TSCA approved landfill because of the presence of metals in some of the PCB contaminated soil.

11.0 EXPLANATION OF SIGNIFICANT CHANGES

The Proposed Plan was released for public comment in April 1992. The Proposed Plan identified a combination of Alternative 3-S: excavation, onsite solidification and disposal in an on-site double lined RCRA landfill; Alternative 2-P: Excavation and offsite disposal for soils with PCB concentrations above 50 ppm and excavation, on-site solidification and disposal in the planned landfill noted above for soils containing PCBs between 25 and 50 ppm; and Alternative 2-GW: groundwater treatment and discharge to the St. Lucie Canal or the POTW or an industrial user.

EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, EPA, in consultation with the State of Florida, decided to defer the groundwater component of the proposed remedy to the second operable unit for this site. This will allow EPA to initiate cleanup of the contaminated soils which are a source of groundwater contamination, while a further evaluation is conducted of discharge methods for treated groundwater. EPA will issue a second proposed plan for the second operable unit at the Site and will again seek community input prior to the selection of a remedial action for the contaminated groundwater and wetlands.

References

Completion Report, Task I PCB Remedial Action Plan, Florida Steel Corporation Indiantown Mill, Indiantown, Florida, dated October 2, 1986, Ardaman and Associates.

Phase I Remedial Investigation Report, Florida Steel Corporation Indiantown Mill Site, dated September 30, 1988, Ardaman and Associates.

Phase II Remedial Investigation Report, Florida Steel Corporation Indiantown Mill Site, dated October 17, 1989, Ardaman and Associates.

Human Health and Environmental Risk Assessment of the Florida Steel Corporation Indiantown Mill Site, dated January 1991, Envirologic, Inc.

Results of Groundwater Sampling Through June 1991, Florida Steel Corporation Indiantown Steel Mill, dated December 19, 1991, Mark Schultz Associates

Feasibility Study Report, Florida Steel Corporation Indiantown Mill Site, dated March 13, 1992, Ardaman and Associates.

APPENDIX C: RISK CALCULATION CONSTANTS

Several assumptions and constants used in determining exposure and calculating site risks and are presented in the following tables:

Current and Future Use Scenarios
Soil Ingestion

Relative Absorption	1 (unitless)	1 (unitless)
Ingestion Rate	50 mg/day	50 mg/day
Exposure Frequency	120 days/year	120 days/year
Exposure Duration	40 years	40 years
Body Weight	70 kilograms (kg)	70 kg
Averaging Time	14,600 days	25,500 days

Current and Future Use Scenarios
Soil Dermal Contact

	Noncarcinogenic chronic effects	Carcinogenic effects
Adherence factor	1 mg/cm^2	1 mg/cm^2
Relative absorption*	.01 unitless	.05 unitless
Skin Surface Area	1700 cm^2	1700 cm^2
Exposure Frequency	120 days/year	120 days/year
Exposure Duration	40 years	40 years
Body Weight	70 kg	70 kg
Averaging Time	14,600 days	25,500 days

* .01 - inorganics .05 - PCBs

APPENDIX C (cont.)

Future Use Scenarios
Dermal Contact with Groundwater (handwashing)

	Noncarcinogenic chronic effects	Carcinogenic effects
Skin Surface Area	1700 cm^2	1700 cm^2
Exposure Time	.167 hrs/day	.167 hrs/day
Exposure Frequency	120 days/year	120 days/year
Exposure Duration	40 years	40 years
Body Weight	70 kg	70 kg
Averaging Time	14,600 days	25,500 days

Nearby Residential Future Use
Ingestion of Groundwater

		Noncarcinogenic chronic effects	Carcinogenic effects
Body weight	Adult	70 kg	70
	child	17 kg	17
Ingestion rate	Adult	2 l/day	2
	Child	1 l/day	1
Relative absorption		1 unitless	NA
Exposure Frequency		365 days/year	365
Exposure Duration			
	Adult	30 years	30
	Child	6 years	6
Averaging Time	Adult	10,950 days	
	Child	2,190 days	
Lifetime Dose		538,740 pCi/L (Ra-226)	
		63,510 pCi/L (Ra-228)	

APPENDIX C (cont.)

Nearby Residential Future Use

Dermal contact with groundwater (bathing)

Exposed Skin Surface Area	Adult	18,000 cm^2	18,000 cm^2
	Child	5,760	5,760
Exposure Time (hours/day)		.33	.5
Exposure Frequency (days/year)		365	365
Exposure Duration (years)	Adult	30	30
	Child	6	6
Averaging Time (days)	Adult	10,950	10,950
	Child	2,190	2,190
Permeability Rate (cm/hr)		5.0E-4	