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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R04-90/061
September 1990

EPA

Superfund
Record of Decision:

Schuylkill Metal, FL

50272-101

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 17-acre Schuylkill Metal site is a former battery recycling facility containing marsh areas in the southwest portion of Plant City, Hillsborough County, Florida. From 1972 to 1986, the facility was used to recycle lead from batteries; the lead was subsequently sent offsite for smelter processing. Wastes generated in the recycling process included rubber and plastic chips from battery casings and sulfuric acid solution. In 1980, the State required the removal of approximately 250 tons of sediment from a disposal pond, 3,000 tons of battery casings, and 500 tons of soil underlying the battery casings. Prior to 1981, acidic washdown wastewaters were stored in a 2.2-acre, unlined wastewater holding pond, and neutralized with lime or ammonia. In 1981, the facility upgraded the wastewater treatment system, and acidic rinse washdown wastewaters were neutralized with sodium hydroxide and discharged into the city's treatment plant. Site investigations conducted in 1981 revealed that onsite surficial aquifer monitoring wells contained elevated levels of ammonia. Analyses of soil, surface water, and sediment samples near the processing area and around the holding pond revealed elevated concentrations of metals. This Record of

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Schuylkill Metal, FL
First Remedial Action - Final
Contaminated Media: soil, sediment, debris, gw, sw
Key Contaminants: metals (lead, chromium, arsenic), acids

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 109
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(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

EPA/ROD/R04-90/061
Schuylkill Metal, FL
First Remedial Action - Final

Abstract (continued)

Decision (ROD) provides a final remedy and addresses all contaminants at the site. The contaminants of concern affecting the soil, debris, sediment, ground water, and surface water are acids and metals including lead, arsenic, and chromium.

The selected remedial action for this site includes excavation and onsite solidification of approximately 36,000 cubic yards of contaminated soil from the process area and approximately 2,000 cubic yards of contaminated sediment from the ditches; onsite disposal of treated soil and sediment; debris recycling; onsite treatment of surface water from the wastewater holding pond and pumping and treatment of ground water by chemical action and filtration, followed by offsite discharge of the treated surface and ground water to a publicly owned treatment works (POTW) or to surface water; biological monitoring of the east and west onsite marshes; installing flood control mechanisms to maintain continued surface water inundation in the east marsh; mitigating the wetlands that have been adversely impacted by the site; and implementating of site access restrictions including fencing. The estimated present worth cost for this remedial ranges from $5,864,000 to $8,161,000, depending on O&M costs, which will be estimated during the RD/RA phase.

<u>PERFORMANCE STANDARDS OR GOALS</u>: All soil with lead levels of 500 mg/kg and ditch sediment to a depth of 2 feet will be treated by chemical stabilization. This cleanup level was based on site-specific analyses to prevent excessive lead leaching to the ground water. Debris will be excavated to a depth of between 3 and 10 feet below land surface and will be recycled. Ground water cleanup level is lead 0.015 mg/l (MCLs or background levels), and treated water discharged to nearby wetlands will achieve lead levels of 0.013 mg/l (WQC). The Ambient Water Quality Criteria for the existing marsh and for surface water has been waived, due to the potential for destructive effects of the remediation on the wetlands.

RECORD OF DECISION
THE DECLARATION

SITE NAME AND LOCATION

Schuylkill Metals Corporation
Plant City, Hillsborough County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Schuylkill Metals Corporation site, in Plant City, Florida, which 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 in the selected remedy.

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 and final action for the site. This remedy addresses the source, soil, sediment, surface water, and groundwater contamination. This action addresses the principal threat at the site by excavating and treating the most highly contaminated soils. This action also addresses the potential environmental threat of the marshes.

The major components of the selected remedy include:

- Excavation and treatment, via on-site solidification, of approximately 36,000 cubic yards of contaminated soils from the process area and approximately 2,000 cubic yards of contaminated sediments from the perimeter ditch;

- Disposal on-site;

- Debris recycling;

- Treatment of surface water from the wastewater holding pond and groundwater on-site;

- Disposal of treated water to the publicly owned treatment works (POTW) or surface waters;
- East and west marsh fencing and biological monitoring;
- East marsh flood control mechanisms to maintain continued surface water inundation and biological monitoring;
- Mitigation to compensate for the wetlands that have been adversely impacted by the site; and,
- A waiver of the Federal Ambient Water Quality Criteria (AWQC) is required for the surface water. The waiver is justified by the potential negative environmental impact that could be created by achieving this standard in the marsh. This would involve complete destruction of wetlands and potential mobilization of metals beyond the site area (CERCLA 121(d)(4)(B)).

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, except where a waiver can be justified for whatever Federal and State applicable or relevant and appropriate requirement will not be met, 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 this 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.

SEP 2 8 1990

Date

Greer C. Tidwell for
Regional Administrator

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FIGURES

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RECORD OF DECISION
DECISION SUMMARY

SCHUYLKILL METALS CORPORATION SITE
Plant City, Hillsborough County, Florida

Prepared by

U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

September, 1990

Record of Decision
The Decision Summary
Schuylkill Metals Corporation Site
Plant City, Florida

1.0 SITE BACKGROUND

1.1 Site Location

The Schuylkill Metals Corporation (SMC) site is located at 402 South Woodrow Wilson Street in the southwestern portion of Plant City, Florida (Figure 1). The population estimate for Plant City is 20,000 and covers an area of 1,423 sq. miles. Plant City is located approximately 25 miles east of Tampa, Florida. Residents of Plant City and the vicinity primarily work in agriculture, phosphate mining or commute to Tampa or Lakeland for employment. Land use in the Plant City area is primarily agricultural. Row crops such as strawberries and citrus are the primary crops cultivated in the area.

1.2 Site Description

SMC in Plant City covers an area of approximately 17.4 acres and has an irregular shape. Adjacent properties include undeveloped lands and a railroad line to the north, a housing development and agricultural pastureland to the south, an oil distribution terminal and housing to the east, and agricultural land with scattered housing to the west.

A general site map of the SMC facility is shown on Figure 2. The facility can be divided into several areas based on former SMC operations. These areas are the processing area (office, truck scales, maintenance building, liquid storage area, the railroad spur area and the truck parking area), the wastewater holding pond, the perimeter ditch and the marsh areas. The processing area (Figure 2) consists of approximately 2.3 acres and the former wastewater holding pond covers approximately 2.2 acres.

A 5-acre east marsh borders the eastern side of the site and measures approximately 800 feet by 500 feet. A "T"-shaped canal exists within the marsh and periodically discharges to a culvert. The wetland is classified as permanently flooded depressional Palustrine emergent; however, various species of shrubs are present also. The facultative plants vegetate the higher areas of elevation within the marsh. The dominant emergent is smartweed which is high in value as a waterfowl source.

A contour map showing the site topography is shown on Figure 3. There is a gentle slope from the west and the southwest toward the SMC property. To the north, the railroad embankment controls the elevations on that side of the site.

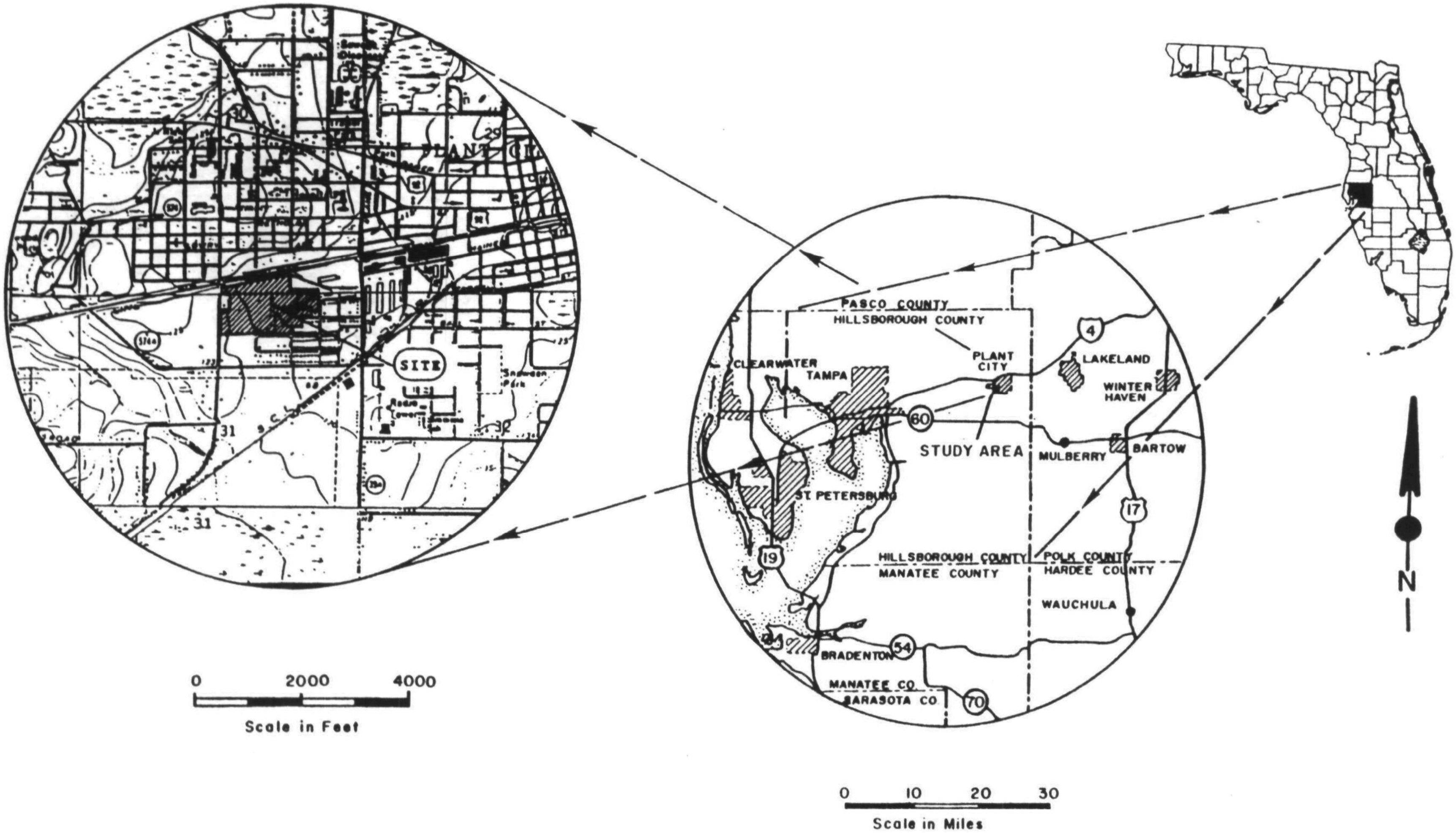
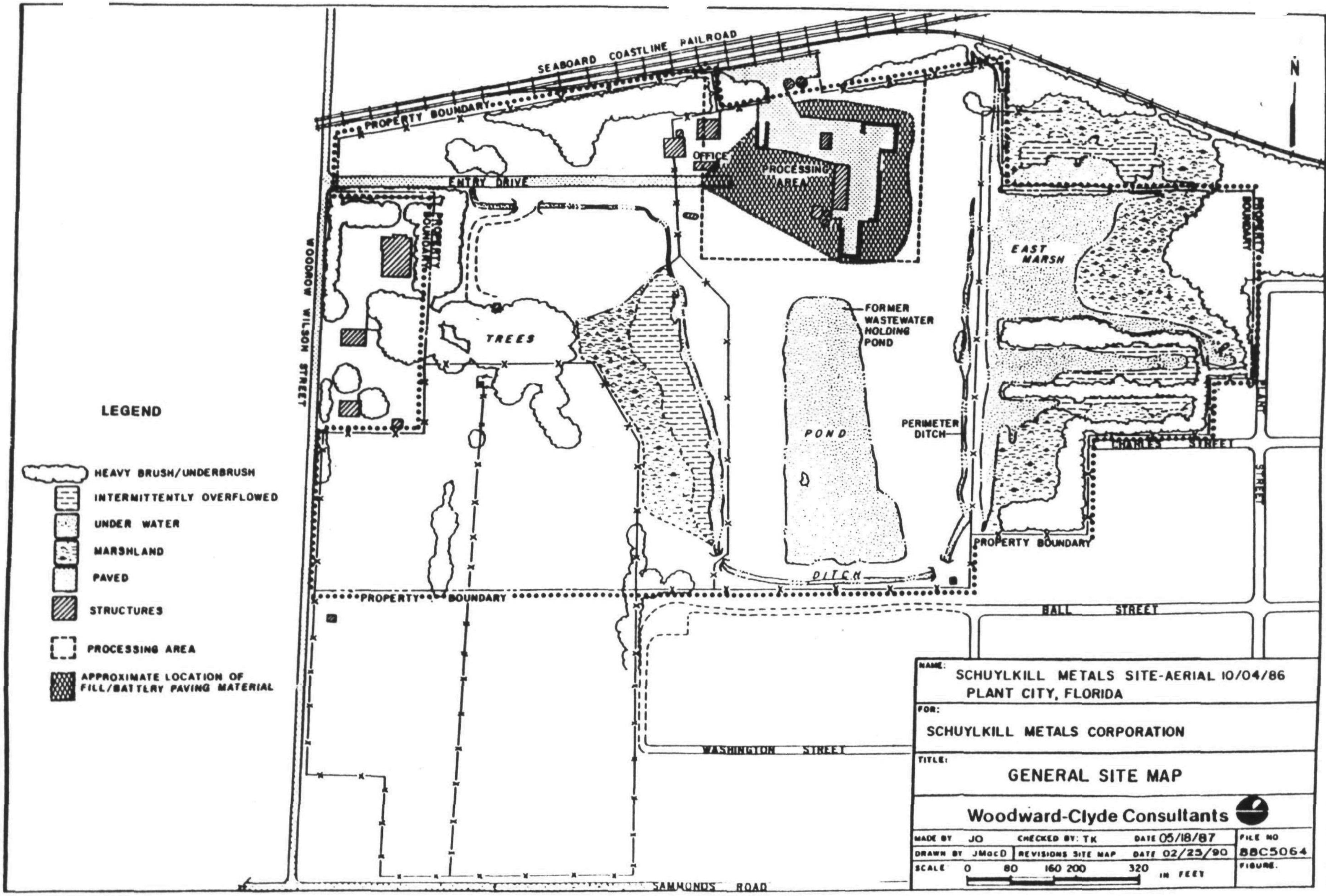


FIGURE	FILE No. 85C5449	NAME: SCHUYLKILL METALS — PLANT CITY, FLORIDA FOR: SCHUYLKILL METALS CORPORATION	LOCATION MAP SCHUYLKILL METALS SITE - PLANT CITY, FLORIDA.	Woodward-Clyde Consultants

DRAWN BY:	MADE BY: RL	DATE: 07/29/86	FILE No.
JMacD	CHECKED BY: TK	DATE: 07/29/86	85C5449
SCALE:	NOTED		FIGURE

FIGURE 1



SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
OFFICE
PROCESSING AREA
ENTRY DRIVE
WOODROW WILSON STREET
TREES
EAST MARSH
FORMER WASTEWATER HOLDING POND
POND
PERIMETER DITCH
DITCH
CHARLES STREET
BALL STREET
WASHINGTON STREET
SAMMONDS ROAD
N
LEGEND
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
PROCESSING AREA
APPROXIMATE LOCATION OF FILL/BATTERY PAVING MATERIAL
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: GENERAL SITE MAP
Woodward-Clyde Consultants
MADE BY JO
CHECKED BY: TK
DATE 05/18/87
FILE NO 88C5064
DRAWN BY JMacD
REVISIONS SITE MAP
DATE 02/23/90
FIGURE.
SCALE 0 80 160 200 320 IN FEET

FIGURE 2

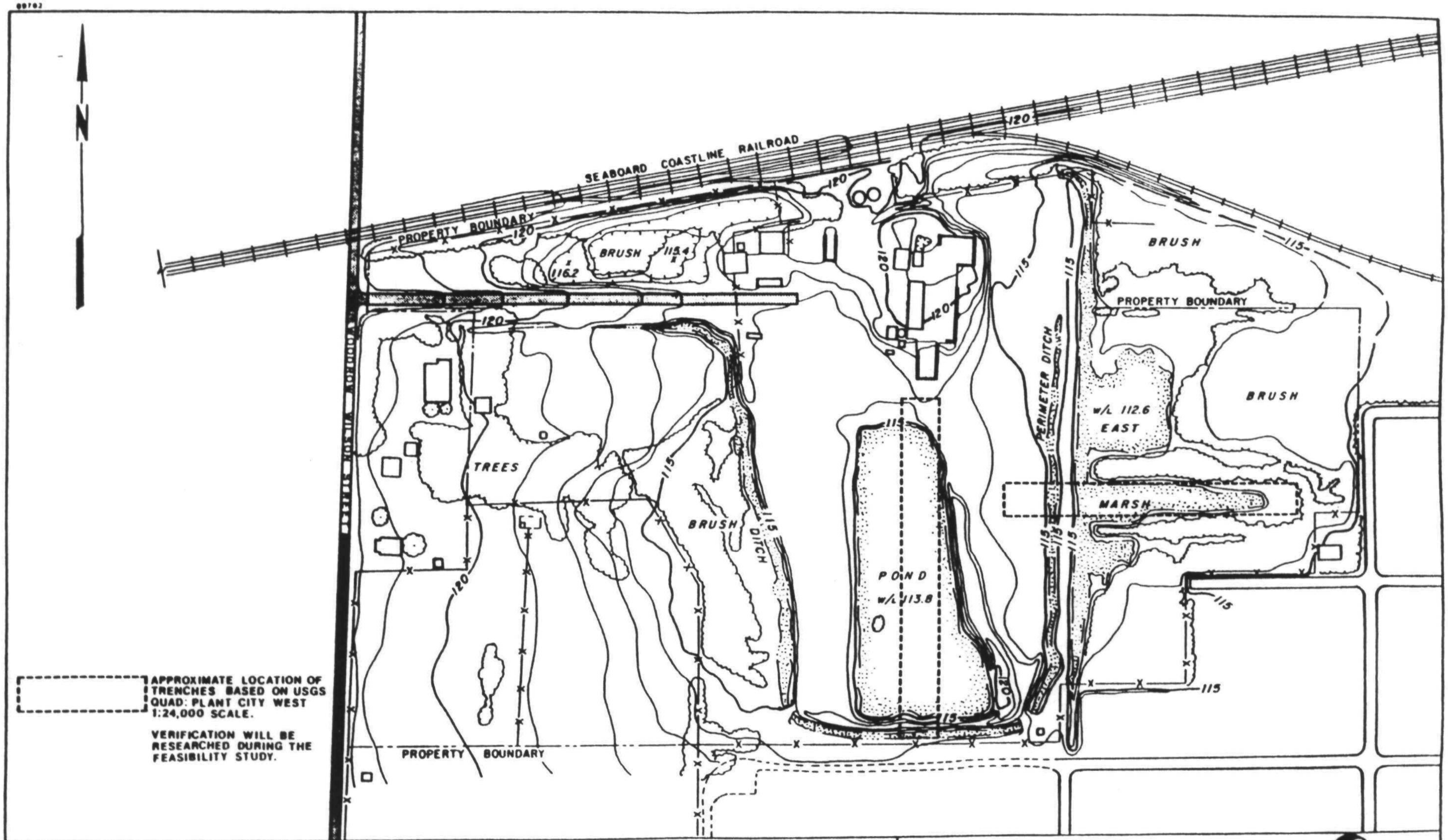


FIGURE:

FILE NO: 88C5064

NAME: SCHUYLKILL METALS SITE
PLANT CITY, FLORIDA

FOR: SCHUYLKILL METALS CORPORATION

TITLE: TOPOGRAPHIC SITE MAP

CONTOUR INTERVAL: 1 FOOT

TOPOGRAPHIC SURVEY BY KUCERA SOUTH, INC. 3/87

Woodward-Clyde Consultants

MADE BY: KB	CHECKED BY: RL	DATE: 7/12/89	FILE NO 88C5064
DRAWN BY: JMacD	REVISIONS:	DATE:	
SCALE: 0 80 160 200 320 IN FEET			FIGURE:

1.3 Site Geology and Hydrogeology

1.3.1 Introduction

The SMC site is underlain by three aquifer systems. In descending order these aquifers are the surficial, intermediate (Hawthorn), and Floridan aquifers (Figure 4).

1.3.2 Surficial Aquifer System

The surficial aquifer system of the SMC site consists of well sorted and silty sand, having high concentrations of organic material. Locally, this unit ranges from eight to twenty feet in thickness. Figures 5 and 6 are northeasterly trending cross-sections, showing a thinning of the unit in the central portion of the site. Groundwater in the surficial aquifer occurs under unconfined conditions.

1.3.3 Surficial Aquifer Hydraulic Properties

Aquifer testing indicates a moderate transmissivity of 132 square feet per day (ft^2/day) and a hydraulic conductivity of 10.15 ft/day. The estimated groundwater flow velocity calculated from aquifer characteristics and the observed water-table gradient is 0.3 ft/day. Figure 7 shows the configuration of the water-table aquifer and direction of groundwater flow.

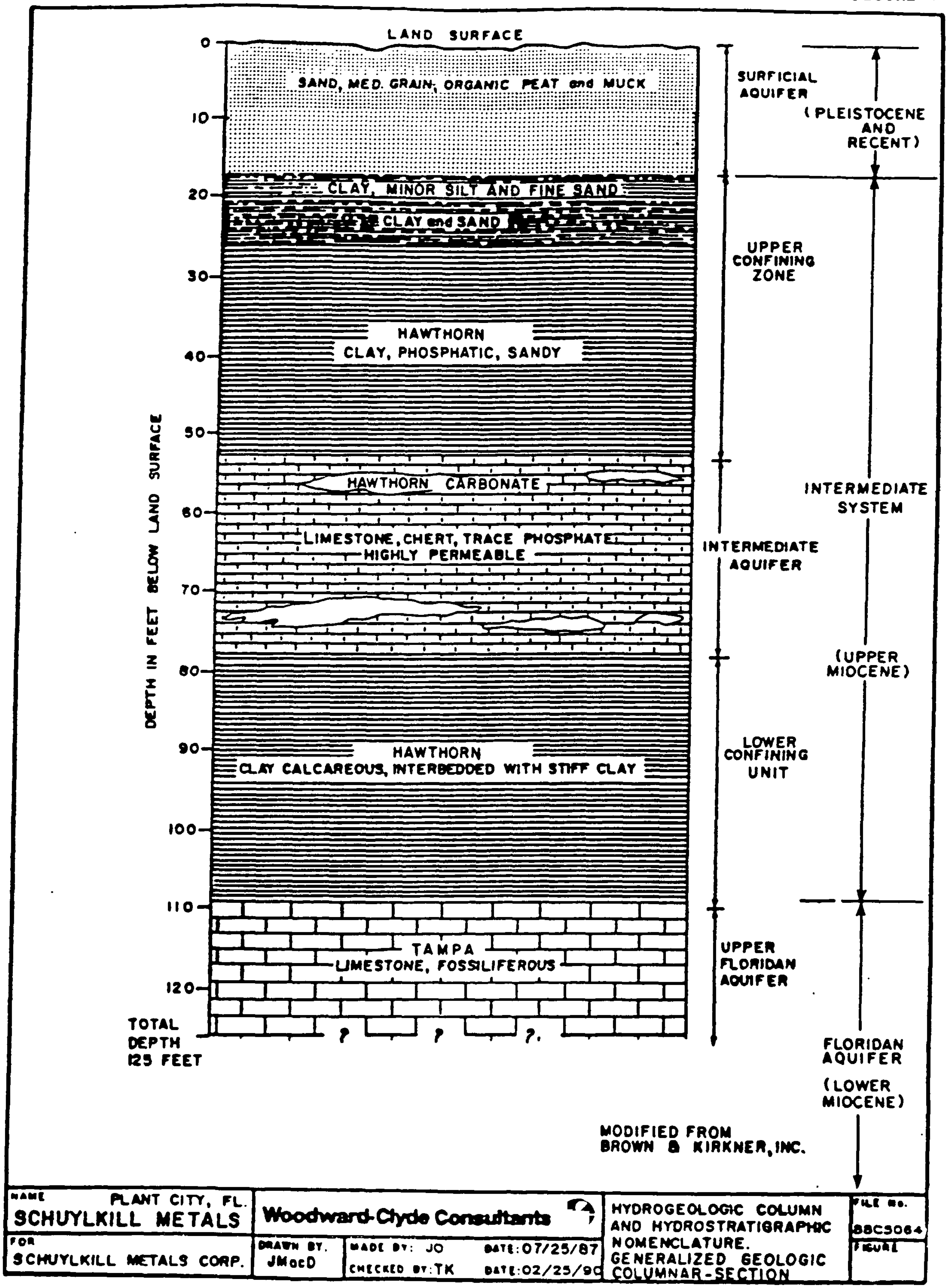
1.3.4 Intermediate Aquifer System

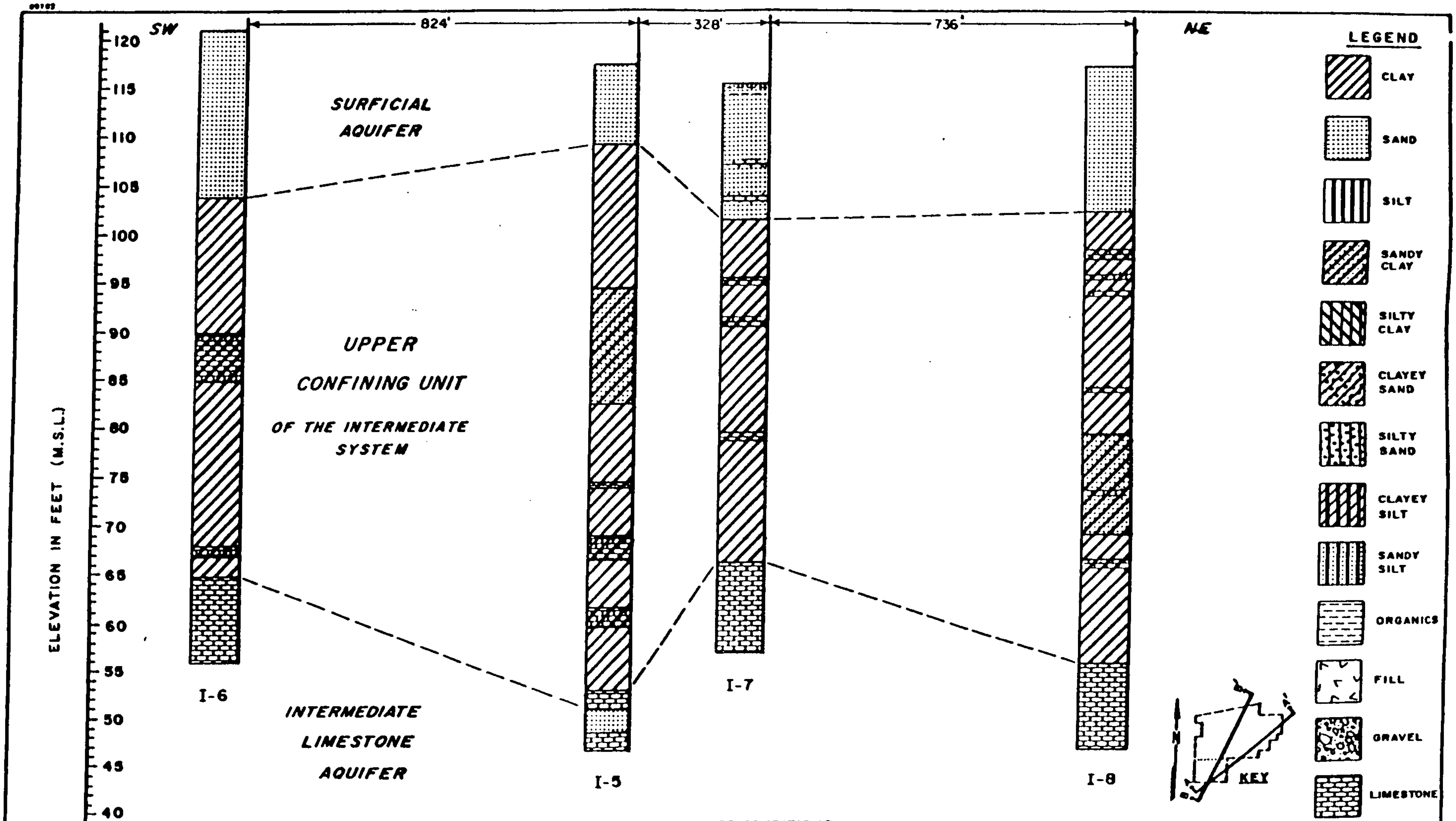
The upper unit of the intermediate aquifer is dominantly a sandy and phosphatic clay, ranging from 36 to 55 feet in thickness (Figures 5 and 6). This upper confining clay is interrupted by limestone beds measuring one to five feet in thickness. Immediately below the clay, a laterally persistent, moderately-to-highly permeable limestone unit ranging from 10 to 25 feet in thickness forms the actual aquifer. Below this limestone, a 30 foot thick calcareous clay, interstratified with a stiff clay overlies the Tampa limestone. The Tampa unit is the upper member of the Floridan aquifer and is the lower confining unit of the intermediate aquifer. This sequence of clays and limestones below the surficial aquifer belongs to the Hawthorn Formation.

1.3.5 Intermediate Aquifer Hydraulic Properties

Vertical permeability measurements made on samples from the upper confining clay gave values of 10^{-5} ft/day, indicating very low permeability. This is in contrast to the transmissivity of 160 ft^2/day and hydraulic conductivity of 16 ft/day calculated from an aquifer test conducted in a well completed in the limestone of the Hawthorn Formation. The estimated groundwater flow velocity of the intermediate aquifer is 2.5 ft/day.

FIGURE 4


LAND SURFACE
0
10
20
30
40
50
60
70
80
90
100
110
120
DEPTH IN FEET BELOW LAND SURFACE
SAND, MED. GRAIN, ORGANIC PEAT and MUCK
CLAY, MINOR SILT AND FINE SAND
CLAY and SAND
HAWTHORN
CLAY, PHOSPHATIC, SANDY
HAWTHORN CARBONATE
LIMESTONE, CHERT, TRACE PHOSPHATE
HIGHLY PERMEABLE
HAWTHORN
CLAY CALCAREOUS, INTERBEDDED WITH STIFF CLAY
TAMPA
LIMESTONE, FOSSILIFEROUS
TOTAL DEPTH 125 FEET
SURFICIAL AQUIFER
(PLEISTOCENE AND RECENT)
UPPER CONFINING ZONE
INTERMEDIATE SYSTEM
INTERMEDIATE AQUIFER
(UPPER MIOCENE)
LOWER CONFINING UNIT
UPPER FLORIDAN AQUIFER
FLORIDAN AQUIFER
(LOWER MIOCENE)
MODIFIED FROM BROWN & KIRKNER, INC.
NAME PLANT CITY, FL.
SCHUYLKILL METALS
FOR
SCHUYLKILL METALS CORP.
Woodward-Clyde Consultants
DRAWN BY: JMacD
MADE BY: JO DATE: 07/25/87
CHECKED BY: TK DATE: 02/25/90
HYDROGEOLOGIC COLUMN AND HYDROSTRATIGRAPHIC NOMENCLATURE. GENERALIZED GEOLOGIC COLUMNAR-SECTION
FILE NO. 88C5064
FIGURE

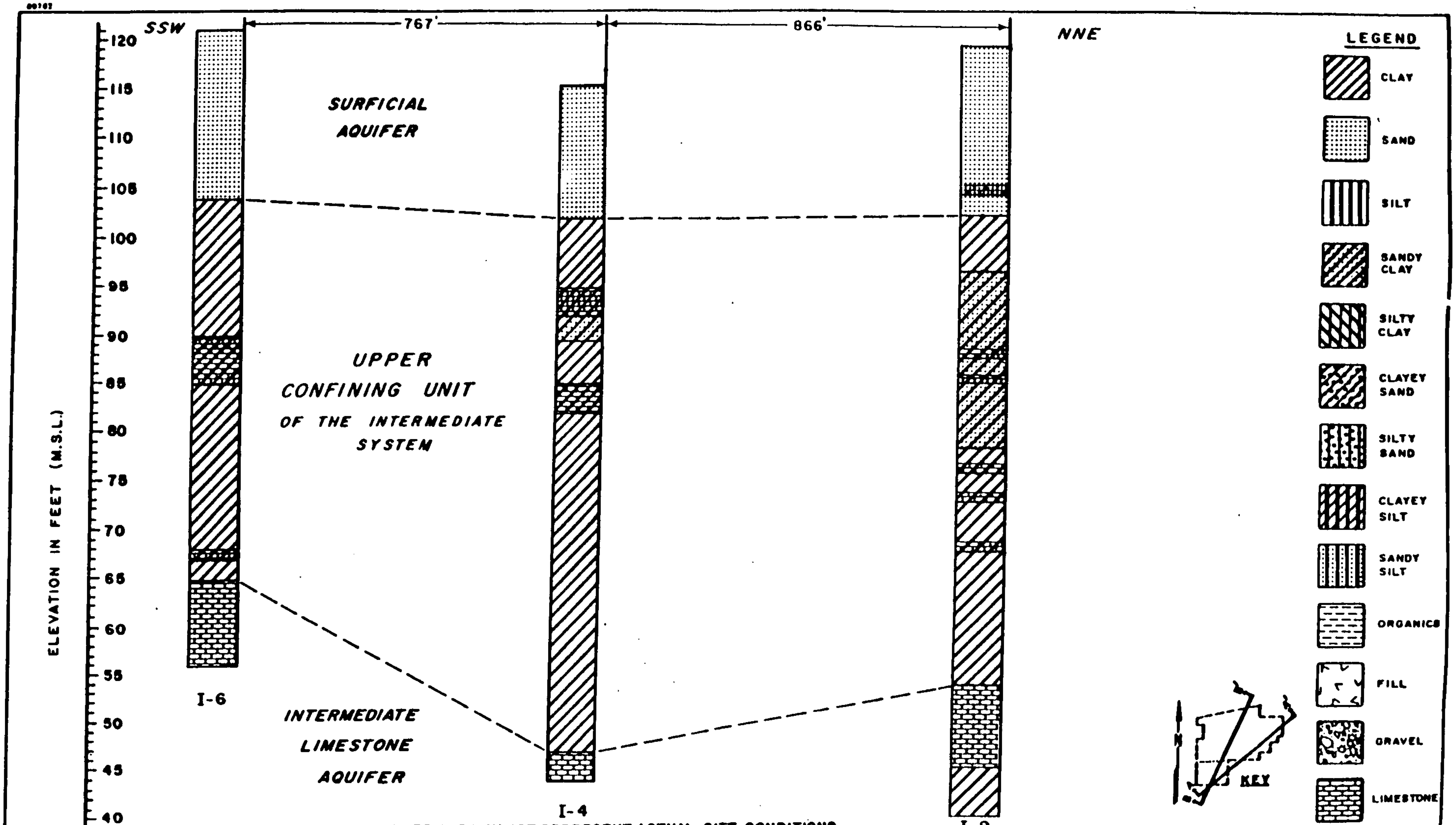


NOTE: DASHED LINES ARE INFERRED AND MAY NOT REPRESENT ACTUAL SITE CONDITIONS.

NAME: SCHUYLKILL METALS CORPORATION PLANT CITY, FLORIDA	TITLE: HYDROGEOLOGIC CROSS SECTION A – A'	Woodward-Clyde Consultants
FOR SCHUYLKILL METALS CORPORATION		MADE BY: JO CHECKED BY: TA DATE: 05/27/87 FILE NO: 88C5064
		DRAWN BY: JMacD REVISIONS: DATE: 02/25/90 FIGURE:
		SCALE: HORIZONTAL 0 100 200 400 IN FEET

FILE NO 88C5064 FIGURE

FIGURE 5



NOTE: DASHED LINES ARE INFERRED AND MAY NOT REPRESENT ACTUAL SITE CONDITIONS.

NAME: SCHUYLKILL METALS CORPORATION PLANT CITY, FLORIDA	TITLE: HYDROGEOLOGIC CROSS SECTION B—B'	Woodward-Clyde Consultants
FOR SCHUYLKILL METALS CORPORATION		MADE BY: JO CHECKED BY: TA DATE: 05/27/87 FILE NO: 88C5064
		DRAWN BY: JMacD REVISIONS: DATE: 02/25/90 FIGURE:
		SCALE: HORIZONTAL 0 100 200 400 IN FEET

FILE NO 88C506- FIGURE

-8-

FIGURE 6

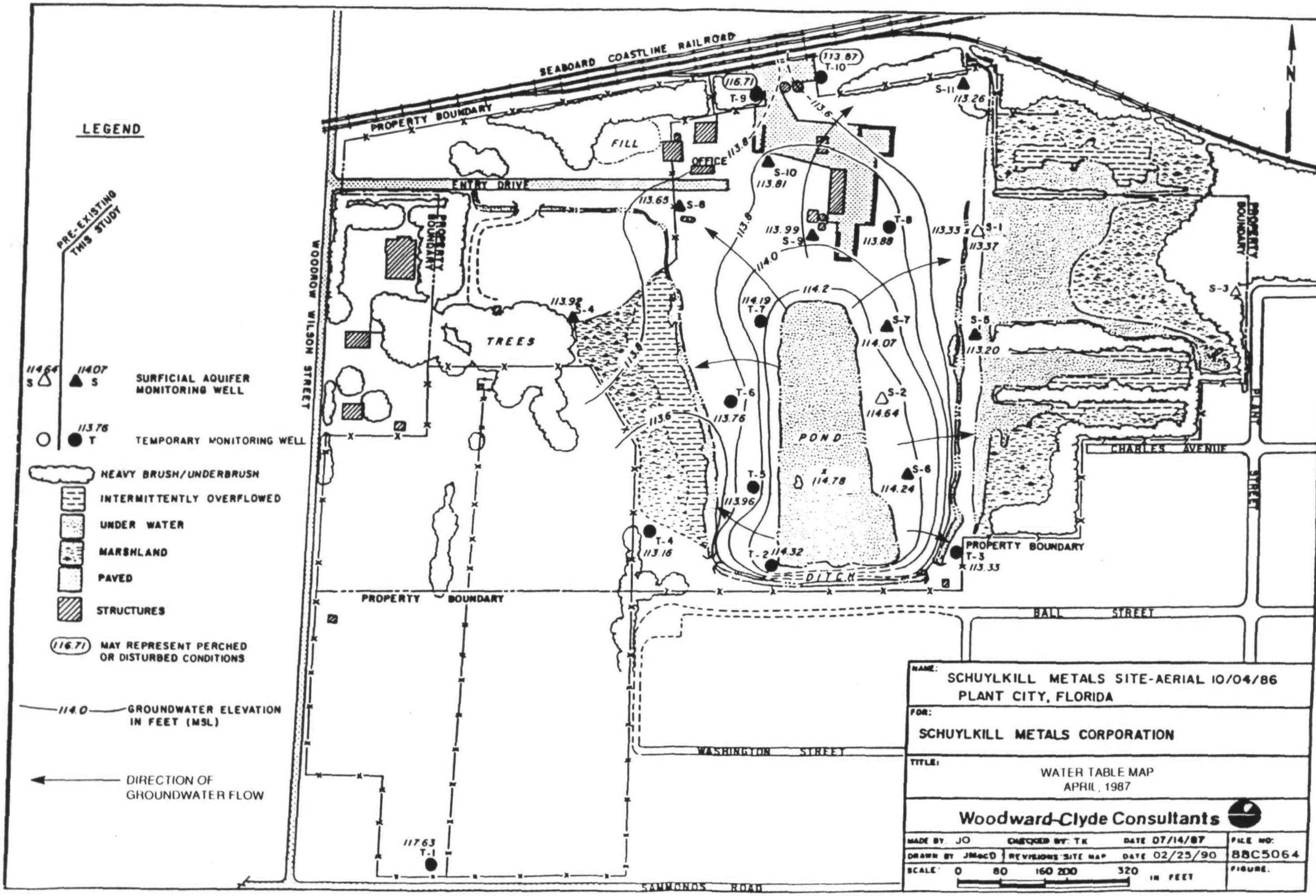

LEGEND
PRE-EXISTING
THIS STUDY
SURFICIAL AQUIFER MONITORING WELL
TEMPORARY MONITORING WELL
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
MAY REPRESENT PERCHED OR DISTURBED CONDITIONS
GROUNDWATER ELEVATION IN FEET (MSL)
DIRECTION OF GROUNDWATER FLOW
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
TREES
POND
DITCH
WOODROW WILSON STREET
CHARLES AVENUE
BALL STREET
WASHINGTON STREET
SAMMONDS ROAD
PLANT STREET
N
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: WATER TABLE MAP
APRIL, 1987
Woodward-Clyde Consultants
MADE BY JO
CHECKED BY TK
DATE 07/14/87
FILE NO: 88C5064
DRAWN BY JMacD
REVISIONS SITE MAP
DATE 02/25/90
SCALE 0 80 160 200 320 IN FEET
FIGURE

FIGURE 7

The permeability of the 30 foot section of clay comprising the lower confining unit was found to be approximately 10^{-5}ft/day.

1.3.6 Floridan Aquifer

Below the intermediate aquifer, the limestones of the Floridan aquifer measures over 1,000 feet in thickness. The top of the unit exists at an elevation of approximately 5 feet above sea level (110 feet below land surface). The Floridan aquifer is the primary source of potable water in the Plant City area.

1.4 Site History

Prior to 1972 the site was relatively undeveloped. From 1972 until June 1986, SMC operated a battery recycling facility at the site. Lead from automobile batteries was reclaimed and sent to Baton Rouge, Louisiana for smelter processing. Until the late 1970's waste generated from the lead recovery process included rubber and plastic battery casings in the form of chips and sulfuric acid solution (electrolyte); however, by the late 1970's most battery casings no longer contained rubber. Battery casing chips were initially used as fill in the process area and later marketed for plastic reclamation. The electrolytic solution in the batteries was also marketed during the later years of operation.

Prior to 1981, acidic washdown wastewaters were stored in an approximately 2.2 acre, unlined wastewater holding pond. Initially, lime was utilized for pH adjustment of the waters stored in the holding pond and later ammonia was used. In 1981, the wastewater treatment system was upgraded and no acidic rinse waters were discharged into the pond. After this date, all wastewaters were treated with sodium hydroxide for pH adjustment and discharged under permit to Plant City's Wastewater Treatment Plant.

Site investigations began in 1978 when Law Engineering and Testing Company (LETC), representing SMC, attempted to define wastewater contamination problems at the site and develop possible alternative wastewater treatment and disposal methodologies. Recommendations for improvement to the then existing system of stormwater and surface water run-off controls were made and subsequently implemented. A test boring and monitoring well installation program, also performed by LETC, provided stratigraphic and hydrogeologic information as well as preliminary data concerning on-site groundwater quality.

In 1981, Ecology and Environment, Inc. as a contractor to US EPA, Region IV, conducted an investigation of SMC. The intent of the study was to determine whether hazardous materials at the site were causing groundwater contamination and, if so, the extent and degree of this contamination. The results of this study indicated that groundwater from the surficial aquifer contained elevated levels of cadmium, chromium, and lead around the wastewater holding pond and elevated levels of lead near the processing area

(E & E, Inc., 1981). In addition, on-site surficial aquifer monitoring wells showed elevated levels of ammonia. No indication of contamination was found in the private wells in the vicinity of the SMC facility; however, the off-site downgradient surficial aquifer was not sampled. Analyses of soil, surface water and sediment samples showed elevated concentrations of lead and cadmium.

In 1984, SMC retained Brown & Kirkner, Inc. and Gulf Coast Engineering, Inc. to prepare a Groundwater Monitoring Plan in compliance with the requirements of Florida Administrative Code Chapter 17-4. Sampling of wells installed in accordance with this plan indicated contaminant concentrations which exceeded Florida's primary drinking water limits for lead and chromium and secondary limits for sulfate in the surficial aquifer east of the processing area.

As a result of the 1981 EPA study and subsequent listing of the site on the National Priorities List (NPL), Woodward-Clyde Consultants performed a Remedial Investigation (RI) at the facility during 1987. This investigation was completed in December, 1987. The investigation was performed at the site to characterize the nature and extent of contamination. Various site media were sampled including soils, surface water, sediments, and groundwater. Soil sampling concentrated around the processing area which was considered to be the probable source of contamination.

In April 1988, Woodward Clyde's RI Addendum Report addressed specific areas of concern that were not included in the initial study. An assessment of the public health was also performed as part of this study. Chemical, hydrologic, and geologic data collected during the RI confirmed that elevated levels of lead and chromium exist in the surficial aquifer underlying the processing area, in the soil underlying the processing area, and the surface water of the wastewater holding pond and perimeter ditch (WWC, 1988).

In July 1988, a draft Feasibility Study (FS) was completed which included proposed cleanup levels for soil and groundwater and evaluated the available remedial alternatives for this site (WWC, 1988).

The FS report was revised to address FDER/EPA review comments. A treatability study work plan was submitted in January 1989, to evaluate chemical fixation as the proposed soil remedy.

In July 1989, Woodward-Clyde completed the FS Addendum 1, Sampling Report for Marsh, Perimeter Ditch, and Surface Impoundment to determine appropriate cleanup levels for the soil, perimeter ditch sediment, and marsh sediment. The Addendum allowed EPA to address potential remedial actions to mitigate the environmental threat to the marshes posed by the release of contaminants from the SMC site.

In May 1989, the Environmental Services Division (ESD) of EPA conducted two studies on the east marsh at the site: a wetland classification assessment and a sampling investigation. The wetland was classified, delineated, and analyzed for its functional value. Samples of the surface water and sediment were collected and analyzed. The ESD Sampling Report and the Wetland Classification Report were completed in August 1989.

These reports identified the need to perform biological testing on marsh samples. In September and October of 1989, ESD collected surface water and sediment samples to determine the toxicity of the metal contaminants to terrestrial and aquatic organisms, indigenous plant and animal bioaccumulation, as well as the fate of these metals in the wetland system. The Wetland Impact Study, finalized in April of 1990, presented the chemical and biological data and the affect of potential remedial activities on the marsh.

A Draft Final Addendum to the Feasibility Study Report, concluded in July of 1990, evaluated the technologies for remediation and the remedial alternatives appropriate for the wetlands. It compared the feasibility of four alternatives in relation to the nine evaluation criteria.

1.5 Enforcement Activities

A temporary operating permit (TOP) was issued by FDER to SMC in July 1980. As a result of a special condition in the TOP, action conducted by SMC included the removal of approximately 250 tons of sediment from the disposal lagoon, 3,000 tons of battery casings and 500 tons of soil beneath the battery casings.

In October 1983, SMC received an Industrial Operating permit from FDER (permit #10 29-51092). The specific conditions of the permit required SMC to evaluate the groundwater quality in both the shallow aquifer and the underlying Floridan Aquifer system by installing a network of monitoring wells at the site. The company's conclusion was not to take immediate remedial action involving the disposal pond.

A comprehensive groundwater interim status inspection was conducted by the EPA Environmental Services Division (ESD) and the FDER Southwest District Office in January 1985, to determine the Resource Conservation and Recovery Act (RCRA) compliance status of Schuylkill Metals Corporation. SMC used the surface impoundment for treatment and disposal of their waste for a number of years. Under a State order, SMC agreed to comply with the RCRA requirements for surface impoundments through the CERCLA action. As a result of violations found during a subsequent RCRA inspection conducted at the facility, the FDER Southwest District Office's enforcement section issued a Notice of Violation (NOV) to SMC in September 1985.

In July 1986, the FDER and SMC entered into a Consent Order which required SMC to perform a remedial investigation/ feasibility study (RI/FS) as required by CERCLA.

In October 1988, a RCRA closure permit was issued under the provisions of Section 403.722, Florida Statutes, and Florida Administrative Code Rules 17-3,17-4, 17-21, 17-22, and 17-30. This directed Schuylkill Metals to close the unlined hazardous waste pond and specified the closure procedures. The RCRA closure/post-closure plan for the disposal pond will be addressed by the CERCLA design for remedial action.

2.0 COMMUNITY RELATIONS HISTORY

The RI/FS and Proposed Plan for the SMC site were released to the public in August 1989 and August 1990. These two documents were made available to the public in both the administrative record and an information repository maintained at the Plant City Public Library and the EPA Docket Room in Region IV, Atlanta. The notice of availability of these two documents was first published in The Courier, and the Tampa Tribune on August 27, 1989. A public comment period was held from August 31, 1989 through September 22, 1989. No comments were received during this public comment period. In addition, a public meeting was to be held on August 16, 1989. However, this meeting was postponed.

A FS Addendum was placed in the repository and a second public comment period was held from August 17, 1990 through September 14, 1990. A notice of availability was published in the Tampa Tribune at the start of the comment period and in The Courier a week prior to the public meeting held on August 30, 1990. At this meeting, representatives from EPA answered questions about the problems being addressed at the site, the remedial alternatives considered, and the alternative tentatively selected by EPA. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for the SMC site in Plant City, Florida, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the administrative record.

3.0 SCOPE AND ROLE OF RESPONSE ACTION

This cleanup remedy will address all contaminants at this site and is considered a final remedy. This action will address the principal threats of the SMC site: contaminated soils in the processing area, surface waters in the holding pond, surface water and sediment in the perimeter ditch, sediment in the east marsh, and groundwater contamination in the surficial aquifer. This action will also address the environmental threats of the east and west marsh.

The soils in the processing area were determined to be the principal threat at the site due to the potential threat of direct contact with the soils and also the leaching of contaminants from the soil to the groundwater. The objective of the response action is to prevent current and future exposure of human and other receptors to the contaminated soils and reduce contaminant migration from the soil to groundwater in order to achieve health based levels in the groundwater.

The surface water of the pond will be remediated through a groundwater collection and treatment system. The risks associated with exposure to ditch surface water will be significantly reduced by sediment excavation. Long-term groundwater monitoring following groundwater remediation will ensure that this remedy is effective in removing the principal threat of exposure through the use of contaminated groundwater as a drinking water source. Verification sampling of the pond sediments after dewatering will address the potential for sediment excavation. The remedial action will be evaluated periodically. This document will also address the east and west marsh contamination. The cleanup objectives for the west marsh are designed to prevent human exposure to the contaminated sediment and surface water through the installation of mechanical barriers. The cleanup objectives for the east marsh are to prevent human and environmental exposure to the contaminated sediments by flooding the marsh, i.e. containment, and to reduce the migration of contaminants. Biomonitoring of the east marsh will document the remedy's impact to the environment and mitigation will create additional wetlands.

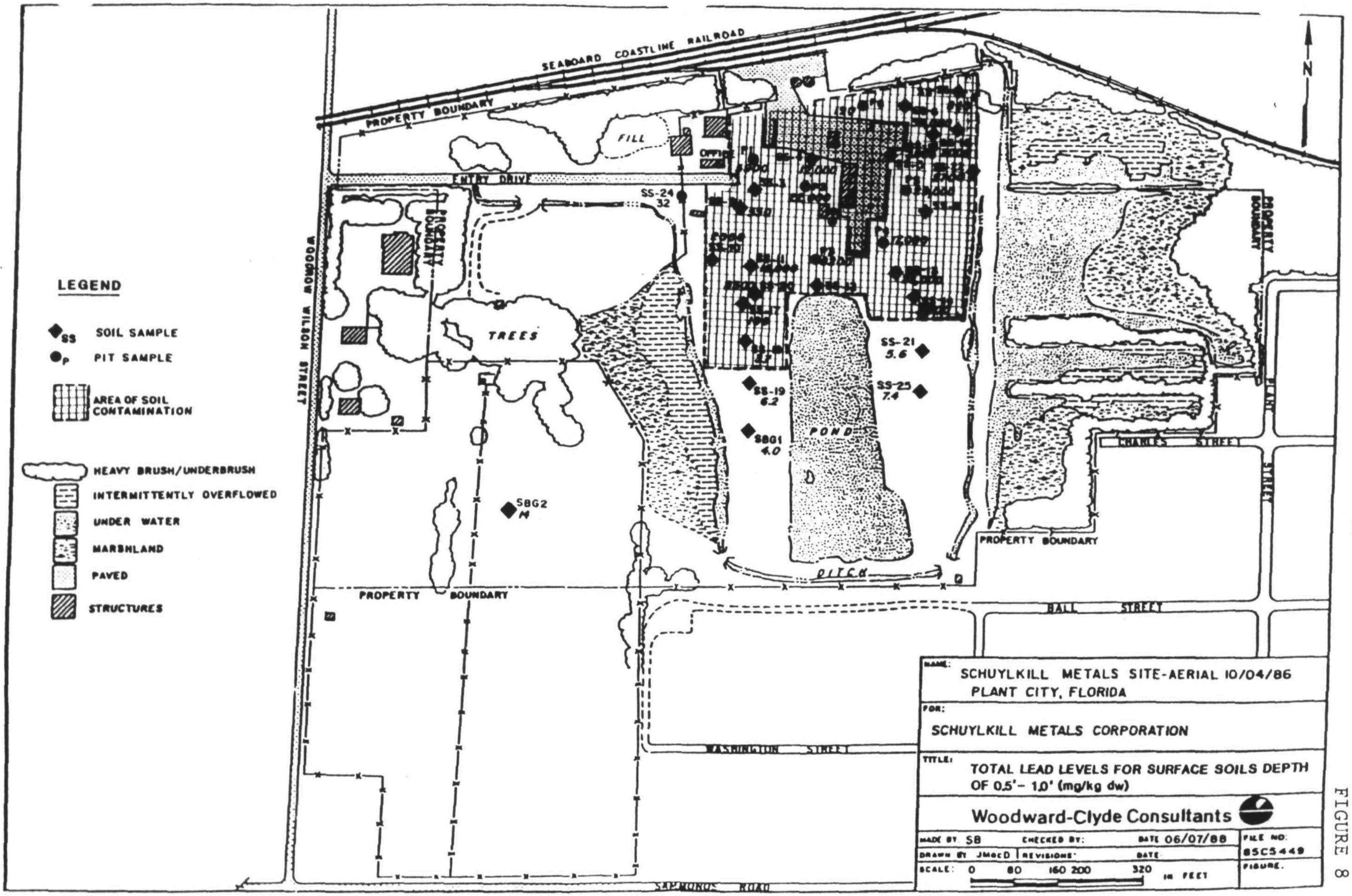
4.0 SITE CHARACTERISTICS

Contaminants of concern at the site include the heavy metals lead, cadmium, chromium, and antimony. These chemicals are present in the soils and in the waters of the site. The processing area soils contain lead at levels which would be classified as a RCRA hazardous waste under the Extraction Procedure (EP) Toxicity test . The surface waters on-site contain levels of lead, cadmium, chromium, and antimony above Florida surface water standards and primary drinking water standards. On-site groundwater also contains concentrations of lead above Florida's drinking water standard.

4.1 Soil

Soil contamination is limited to the area surrounding the existing process pad. Figure 8 shows the horizontal extent of soil contamination. During field investigations, this area was noted to have empty battery casings to depths of up to 7 feet below grade (WWC, 1987).

During the RI and RI Addendum studies, sixty-six soil samples were collected and analyzed to a depth of 8 feet. Total lead concentration in the process area was as high as 51,000 mg/kg in the 1.0 to 2.0 feet below ground surface (BGS) depth range. Results of EP toxicity analysis for lead ranged from below detection limits (BDL) to 34 mg/L in the 0.5-1.0 foot BGS soil samples. Samples collected from the 2 to 3 foot interval had EP toxicity concentrations ranging from BDL to 6.6 mg/L; however, only two of these samples exceeded the 5 mg/L limit for determining hazardous waste under RCRA (WWC, 1988).



SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
SS-24
32
WOODROW WILSON STREET
TREES
SS-21
5.6
SS-25
7.4
SS-19
6.2
SBG1
4.0
POND
SBG2
PROPERTY BOUNDARY
DITCH
CHARLES STREET
BALL STREET
WASHINGTON STREET
N
LEGEND
SS SOIL SAMPLE
P PIT SAMPLE
AREA OF SOIL CONTAMINATION
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: TOTAL LEAD LEVELS FOR SURFACE SOILS DEPTH OF 0.5'- 1.0' (mg/kg dw)
Woodward-Clyde Consultants
MADE BY: SB
CHECKED BY:
DATE 06/07/88
FILE NO: 85C5449
DRAWN BY: JMcD
REVISIONS:
DATE
SCALE: 0 80 160 200 320 IN FEET
FIGURE.

-15-

FIGURE 8

High total lead levels (up to 39,000 mg/kg) were also detected in soil samples collected from the 3 to 8 foot BGS depth range. These high values are attributed to the burial of battery casings during past operations (WWC, 1987).

4.2 Groundwater: Surficial Aquifer

Groundwater of the surficial aquifer contained concentrations of lead above 0.015 mg/L, the proposed cleanup goal. The concentrations ranged from 0.01 to 0.18 mg/L (Figure 9). The only other metal detected above the MCL in the surficial aquifer was chromium, ranging in concentration from 0.06 mg/L, to 0.58 mg/L (WWC, 1987). Chromium has an MCL of 0.050 mg/L and a pMCL of 0.10 mg/L.

The presence of high (13 to 180,000 mg/L) concentrations of sulfate in the surficial aquifer is due to the washdown waters from the process area. The washdown waters have percolated through the soils in the processing area. In addition, waters from the wastewater holding pond have entered the surficial aquifer. Elevated concentrations of sulfate have been noted in the surficial aquifer over a large portion of the site (WWC, 1987).

The pH of the surficial aquifer beneath the processing area is 3.3, approximately two standard units (SU) below control levels (Figure 10). The pH of the control samples is 5.6 and is characteristic of Florida's surficial aquifer. The pH values approach that of the control sample at the processing area boundary (WWC, 1987).

4.3 Groundwater: Intermediate Aquifer

No contaminants above values detected in the control sample were detected in groundwater samples collected from the intermediate aquifer. This suggests that the waters of the surficial aquifer and intermediate aquifer are separated hydraulically. Other factors influencing lack of contaminant migration may be dilution through the relatively rapid movement of groundwater in the intermediate aquifer.

Soil core samples collected and analyzed from the confining unit separating the surficial and intermediate aquifers indicate that it is relatively impervious (10^{-9} ft/sec). As a result of the very low permeability and thickness of this unit, the confining unit appears to be an effective barrier separating the surficial and intermediate aquifers (WWC, 1987).

4.4 Surface Water: East and West Marshes

Surface water samples collected from the east marsh during the RI and subsequently during an investigation conducted by EPA indicate lead concentrations ranging from BDL to 0.440 mg/L (WWC, 1987 and U.S. EPA, 1990). Figure 11 shows the 13 east marsh and 3 west marsh sampling station locations and distribution of lead. Sampling of the west marsh's surface

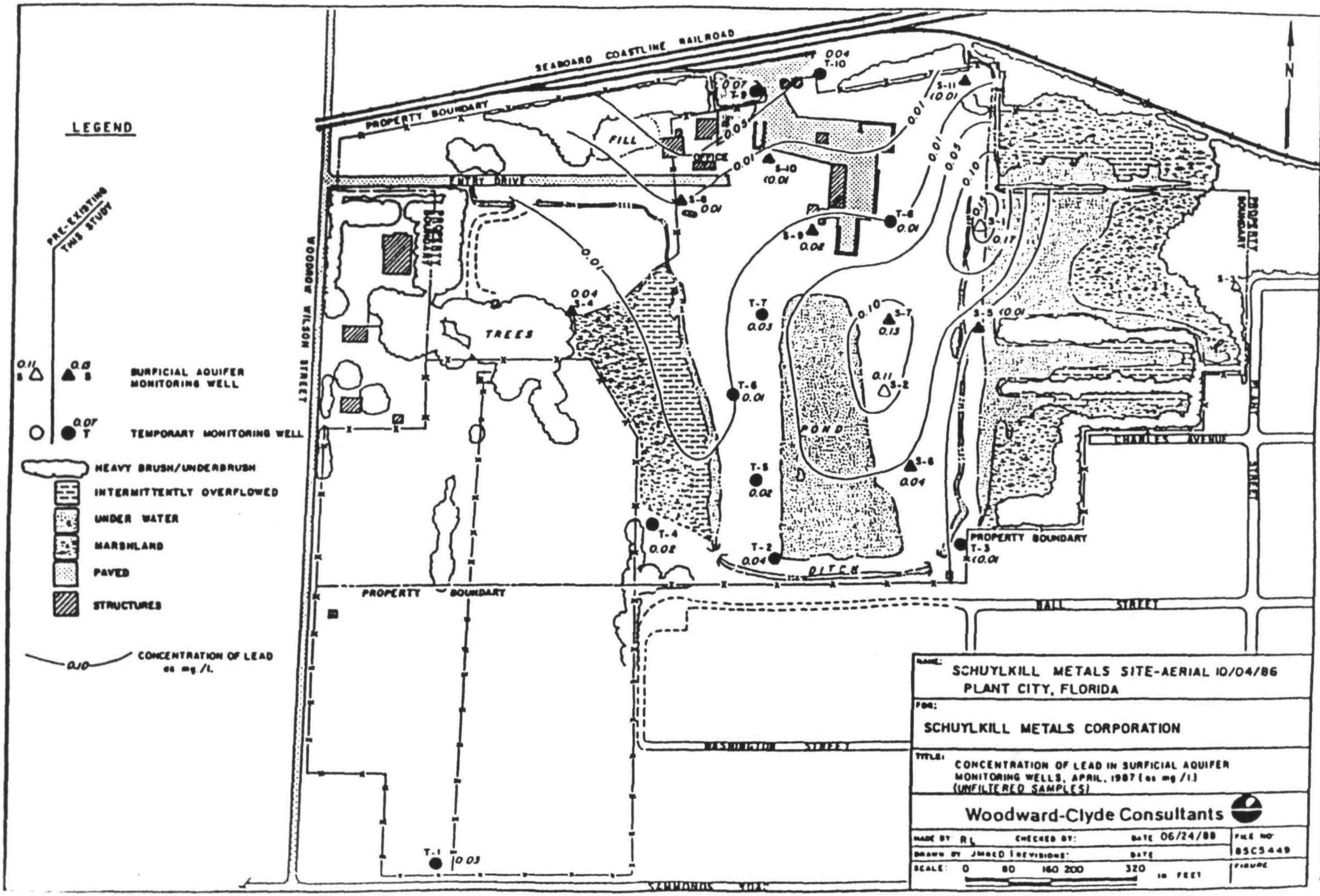

SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
ENTRY DRIVE
FILL
OFFICE
TREES
POND
DITCH
WOODROW WILSON STREET
CHARLES AVENUE
BALL STREET
WASHINGTON STREET
SAMMONDS ROAD
PROPERTY BOUNDARY
N
LEGEND
PRE-EXISTING
THIS STUDY
SURFICIAL AQUIFER MONITORING WELL
TEMPORARY MONITORING WELL
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
CONCENTRATION OF LEAD as mg./l.
T-1 0.03
T-2 0.04
T-3 <0.01
T-4 0.02
T-5 0.02
T-6 0.01
T-7 0.03
T-8 0.01
T-9 0.07
T-10 0.04
S-1 0.17
S-2 0.11
S-3 0.08
S-4 0.04
S-5 <0.01
S-6 0.04
S-7 0.13
S-8 0.01
S-10 <0.01
S-11 <0.01
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: CONCENTRATION OF LEAD IN SURFICIAL AQUIFER MONITORING WELLS, APRIL, 1987 (as mg/l.) (UNFILTERED SAMPLES)
Woodward-Clyde Consultants
MADE BY RL
CHECKED BY:
DATE 06/24/88
FILE NO 85C5449
DRAWN BY JMcD
REVISIONS:
DATE
SCALE: 0 80 160 200 320 IN FEET
FIGURE

FIGURE 9

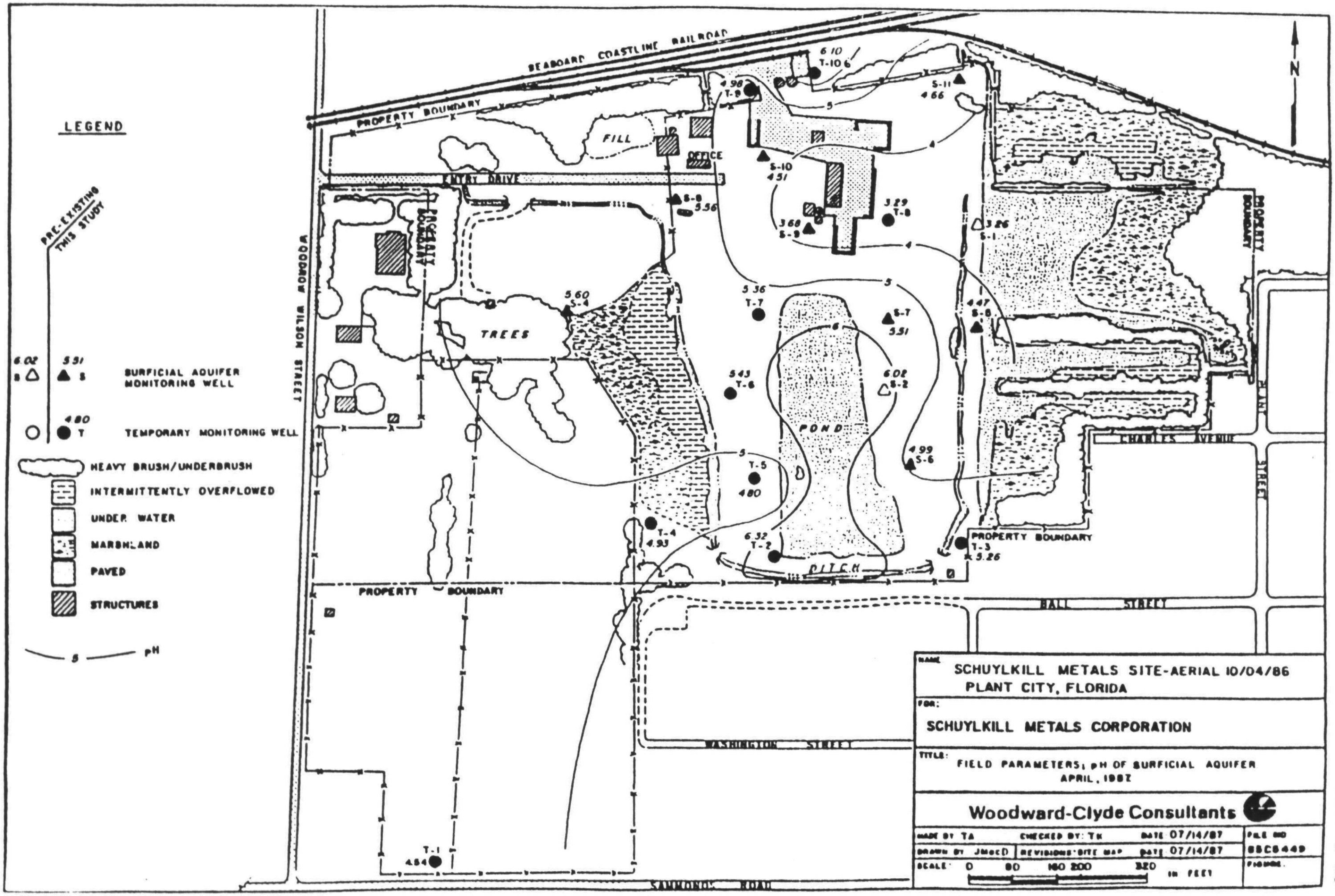
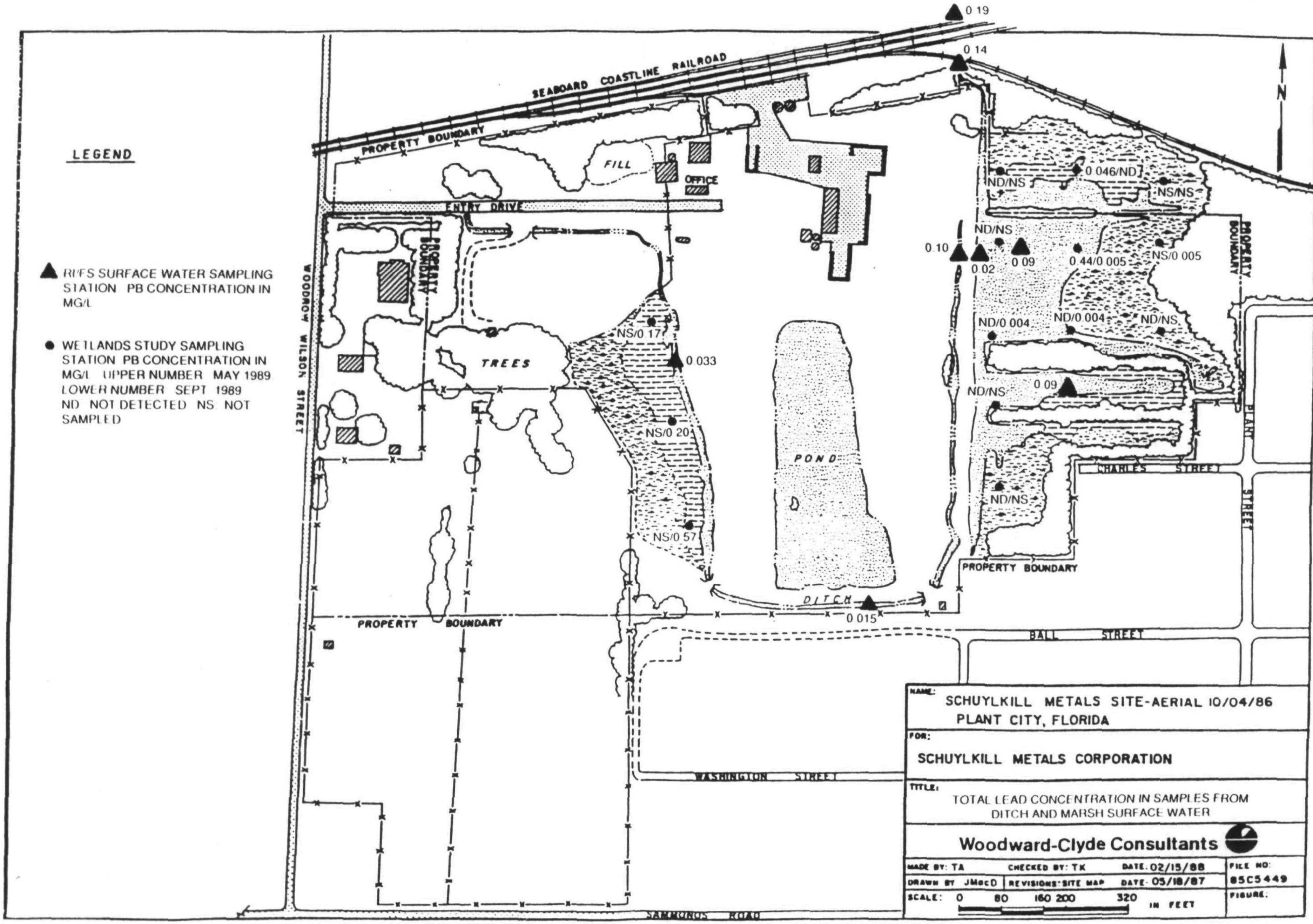

LEGEND
PRE-EXISTING
THIS STUDY
SURFICIAL AQUIFER MONITORING WELL
TEMPORARY MONITORING WELL
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
pH
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
WOODROW WILSON STREET
TREES
POND
DITCH
CHARLES AVENUE
BALL STREET
WASHINGTON STREET
SAMMONDS ROAD
N
SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR:
SCHUYLKILL METALS CORPORATION
TITLE:
FIELD PARAMETERS; pH OF SURFICIAL AQUIFER
APRIL, 1987
Woodward-Clyde Consultants
MADE BY TA
CHECKED BY: TK
DATE 07/14/87
DRAWN BY JMcD
REVISIONS: SITE MAP
DATE 07/14/87
FILE NO
SCALE: 0 80 160 200 320 IN FEET

FIGURE 10



LEGEND
RI/FS SURFACE WATER SAMPLING STATION PB CONCENTRATION IN MG/L
WETLANDS STUDY SAMPLING STATION PB CONCENTRATION IN MG/L UPPER NUMBER MAY 1989 LOWER NUMBER SEPT 1989 ND NOT DETECTED NS NOT SAMPLED
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
WOODROW WILSON STREET
TREES
POND
DITCH
BALL STREET
CHARLES STREET
PLANT STREET
WASHINGTON STREET
SAMMONDS ROAD
N
0 19
0 14
0 046/ND
ND/NS
NS/NS
ND/NS
0 10
0 02
0 09
0 44/0 005
NS/0 005
ND/0 004
ND/0 004
ND/NS
NS/0 17
0 033
ND/NS
0 09
NS/0 20
NS/0 57
ND/NS
0 015
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86 PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: TOTAL LEAD CONCENTRATION IN SAMPLES FROM DITCH AND MARSH SURFACE WATER
Woodward-Clyde Consultants
MADE BY: TA
CHECKED BY: TK
DATE: 02/15/88
FILE NO: 85C5449
DRAWN BY JMacD
REVISIONS: SITE MAP
DATE: 05/18/87
SCALE: 0 80 160 200 320 IN FEET
FIGURE:

FIGURE 11

water indicated lead concentrations ranging from 0.110 mg/L to 0.570 mg/L (Figure 11) (U.S. EPA, 1990). These lead levels exceed Florida's Class III Surface Water Criterion (0.030 mg/L) and the U.S. Ambient Water Quality Criterion (AWQC), which, when adjusted for water hardness at this site, is 0.013 mg/L.

Iron concentrations in surface water samples collected from the east marsh ranged from 0.63 mg/L to 27 mg/L. The surface water samples collected from the west marsh ranged from 1.6 mg/L to 2.8 mg/L iron. Surface water zinc concentrations in the east marsh ranged from 0.01 mg/L to 0.54 mg/L in 18 out of 20 sampling locations and in the west marsh ranged from 0.029 mg/L to 0.39 mg/L in the 3 sample locations. Arsenic was not detected in the 3 west marsh surface water samples; however, arsenic was detected in 4 out of 20 east marsh surface water samples ranging from 0.013 mg/L to 0.54 mg/L. Surface water data for all contaminants tested is found in Appendix I.

4.5 Surface Water: Wastewater Holding Pond Surface Water

Elevated concentrations of lead (average concentration of 1.3 mg/L) were detected in water samples collected from the wastewater holding pond during the 1987 investigation. Sulfate concentrations of approximately 2,200 mg/L were found in all pond water samples. However, since a surface water quality standard for sulfate does not exist and sulfate does not have a secondary drinking water standard, the sulfate is not considered a contaminant of concern. Because the water surface of the holding pond is higher than the surficial aquifer, groundwater mounding creates a potential for movement of contaminants from the pond into the surficial aquifer (WWC, 1987).

4.6 Surface Water: Perimeter Ditch Surface Water

One on-site surface water sample and two off-site samples collected in the ditch contained lead at concentrations ranging from 0.10 to 0.19 mg/L, exceeding the AWQC for this site and the Florida surface water standard. Chromium was below detection limits in the samples analyzed (WWC, 1987). Additional surface water samples collected during the FS Addendum 1 study had concentrations of lead ranging from 0.014 to 0.033 mg/L of lead. Figure 11 shows the distribution of lead in surface waters during both studies.

4.7 Sediments: Wastewater Holding Pond and Perimeter Ditch

Analyses of sediment samples from the perimeter ditch and wastewater holding pond showed levels of lead below the EP Toxicity threshold. Random sampling of the upper 0.5 ft of perimeter ditch samples indicated the presence of lead in 7 out of 10 samples at concentrations ranging from 5.7 to 58 mg/kg. The remaining three samples ranged between 580 to 1,100 mg/kg (Figure 12).

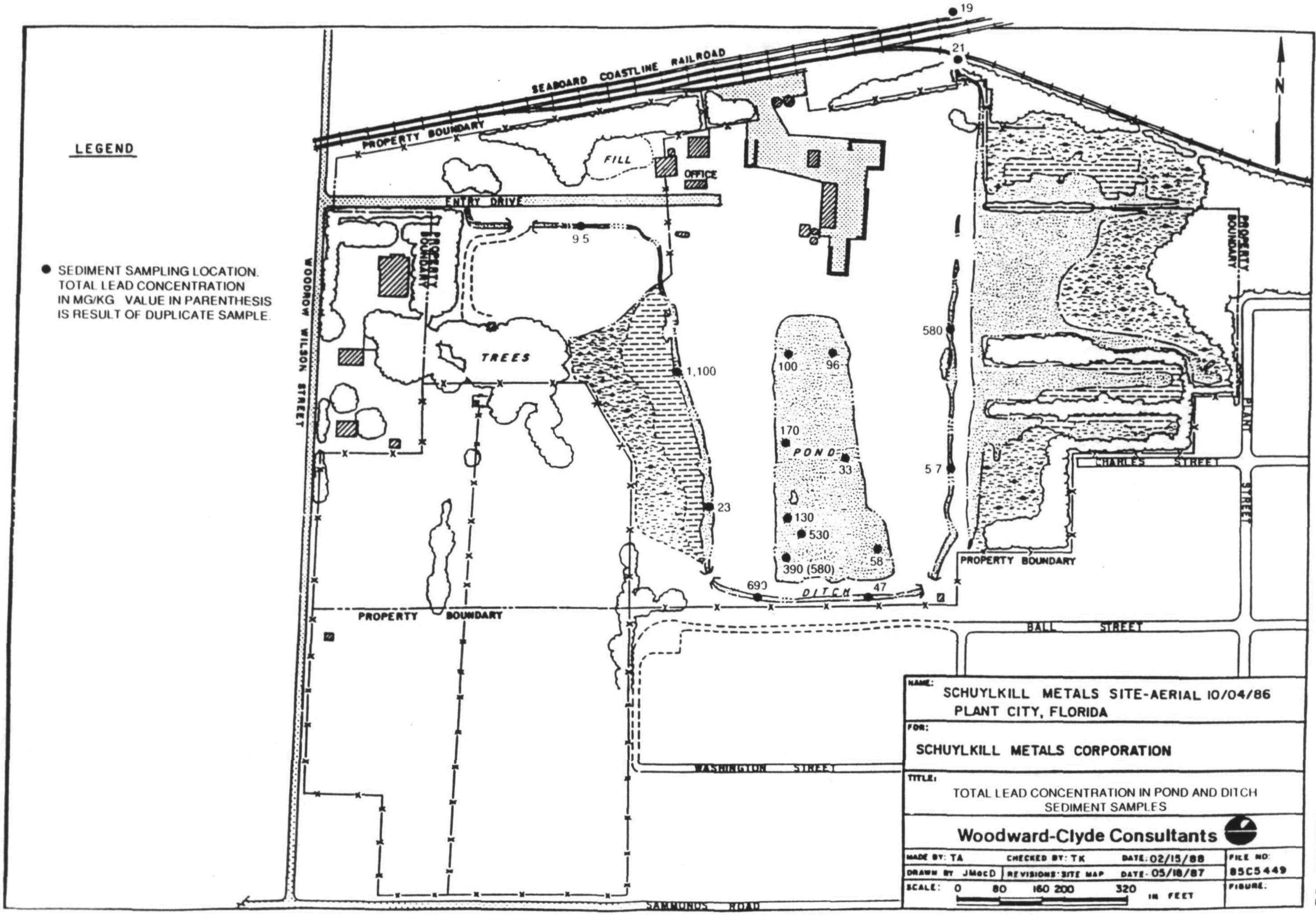

LEGEND
SEDIMENT SAMPLING LOCATION. TOTAL LEAD CONCENTRATION IN MG/KG VALUE IN PARENTHESIS IS RESULT OF DUPLICATE SAMPLE.
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
TREES
POND
DITCH
WOODROW WILSON STREET
CHARLES STREET
PLANT STREET
BALL STREET
WASHINGTON STREET
SAMMONDS ROAD
N
19
21
95
1,100
23
100
96
170
33
130
530
390 (580)
58
690
47
580
57
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86 PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: TOTAL LEAD CONCENTRATION IN POND AND DITCH SEDIMENT SAMPLES
Woodward-Clyde Consultants
MADE BY: TA
CHECKED BY: TK
DATE: 02/15/88
FILE NO: 85C5449
DRAWN BY JMocD
REVISIONS: SITE MAP
DATE: 05/18/87
FIGURE:
SCALE: 0 80 160 200 320 IN FEET

FIGURE 12

4.8 Sediments: East and West Marshes

Analytical data from sediment samples obtained from both marshes are shown on Figure 13. Lead concentrations in the 13 east marsh sample locations range from 110 to 3,500 mg/kg. The highest concentrations were found in the east marsh's canal, where lead concentrations range from 1,200 to 3,500 mg/kg (Figure 13). Arsenic was detected in all marsh sediment sample locations from 9 to 72 mg/kg. Mercury was detected in nine of the sediment samples (0.07 to 0.37 mg/kg).

Of the three sediment samples analyzed from the west marsh, all contained detectable concentrations of lead (520 to 2,800 mg/kg, Figure 13). All of the data shown on Figure 13 represents analytical results for the upper one foot of sediment. Limited data shows decreased lead concentration with depth. Soil and sediment data can be found in Appendix I.

4.9 Contaminant Distribution

The sources of contamination at the site are the processing area, and the former wastewater holding pond. The operation of the plant entailed the disassembly of batteries containing sulfuric acid, metallic lead and lead dioxide. This disassembly resulted in spillage of battery materials to the soils. After pH processing, liquid wastes were piped to the wastewater holding pond where the contaminants (dissolved lead and sulfates) were more widely dispersed.

The high porosity of the surface soils at the site suggests that the primary movement of liquids is downward until they encounter the base of the surficial aquifer. The movement of groundwater within the surficial aquifer is generally radial, away from the holding pond.

Although there are differences in the hydraulic head between the surficial aquifer and the intermediate aquifer, the very low permeability of the intervening confining layer precludes significant vertical movement of groundwater below the surficial aquifer and into the underlying intermediate aquifer.

Movement of sulfate through the shallow aquifer is not controlled by adsorption. Furthermore, precipitation of sulfate only occurs at extremely elevated concentrations, above those observed at the site. However, sulfate in groundwater may be reduced due to its metabolism by bacteria, provided the shallow ground water is without dissolved oxygen and contains organic matter. Despite the potential for the reduction of sulfate, the shallow groundwater concentrations of sulfate demonstrate an elongated plume which extends in a southeasterly direction from the SMC processing site (Figure 14).

The ratio of dissolved lead to sulfate in the site's groundwater is not the same as that typically found in lead-acid batteries. As indicated above, sulfate is subject to biological reduction. Lead may even be less conservative in nature compare to sulfate. For example, dissolved lead

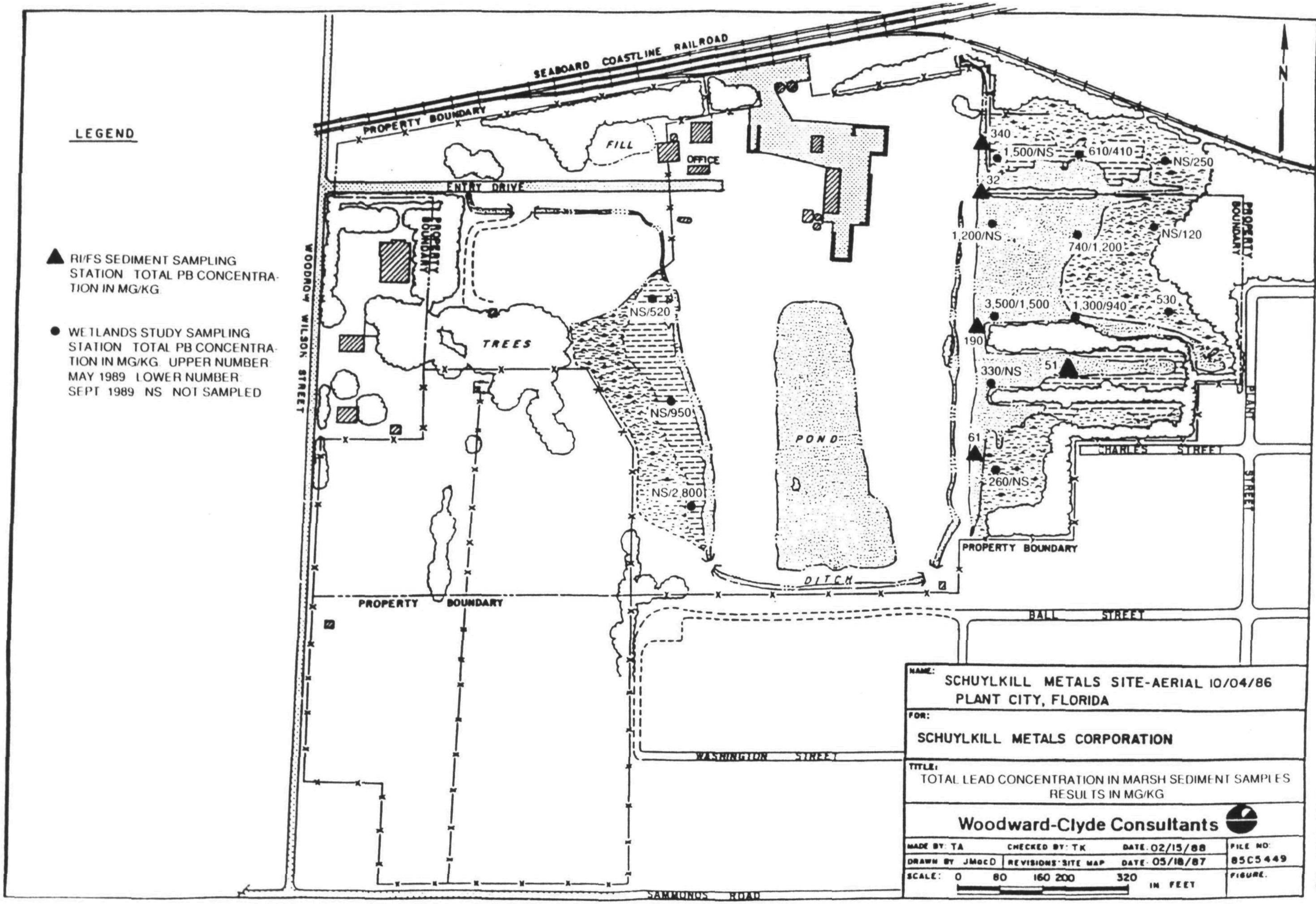
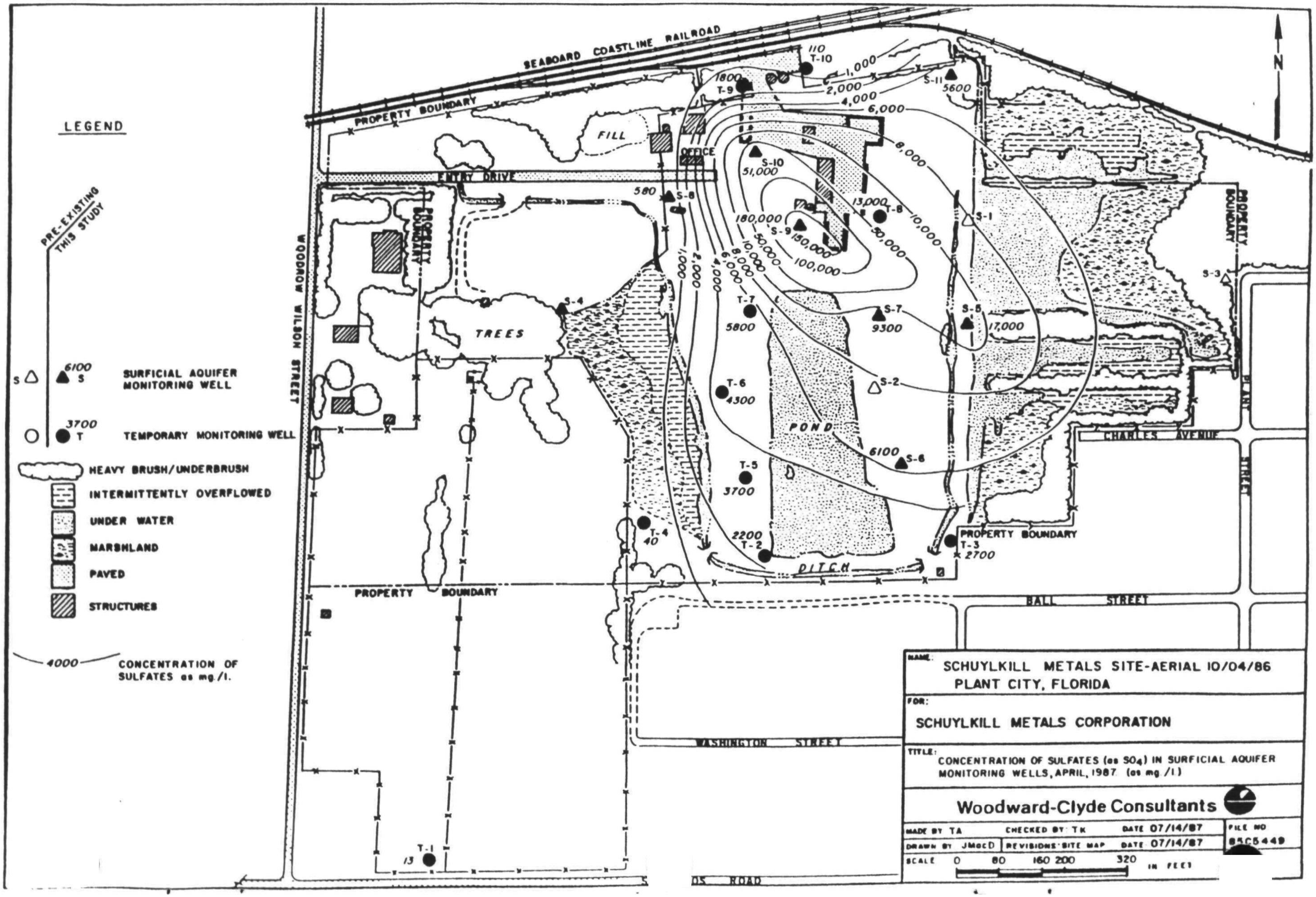

LEGEND
RI/FS SEDIMENT SAMPLING STATION TOTAL PB CONCENTRATION IN MG/KG
WETLANDS STUDY SAMPLING STATION TOTAL PB CONCENTRATION IN MG/KG. UPPER NUMBER MAY 1989 LOWER NUMBER SEPT 1989 NS NOT SAMPLED
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
FILL
OFFICE
ENTRY DRIVE
WOODROW WILSON STREET
TREES
POND
DITCH
BALL STREET
CHARLES STREET
PLANT STREET
WASHINGTON STREET
SAMMONDS ROAD
N
340
32
1,500/NS
610/410
NS/250
1,200/NS
740/1,200
NS/120
NS/520
3,500/1,500
1,300/940
530
190
330/NS
51
NS/950
61
260/NS
NS/2,800
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: TOTAL LEAD CONCENTRATION IN MARSH SEDIMENT SAMPLES RESULTS IN MG/KG
Woodward-Clyde Consultants
MADE BY: TA
CHECKED BY: TK
DATE: 02/15/88
FILE NO: 85C5449
DRAWN BY: JMcD
REVISIONS: SITE MAP
DATE: 05/18/87
SCALE: 0 80 160 200 320 IN FEET
FIGURE.

FIGURE 13



LEGEND
PRE-EXISTING
THIS STUDY
6100 S
SURFICIAL AQUIFER MONITORING WELL
3700 T
TEMPORARY MONITORING WELL
HEAVY BRUSH/UNDERBRUSH
INTERMITTENTLY OVERFLOWED
UNDER WATER
MARSHLAND
PAVED
STRUCTURES
4000
CONCENTRATION OF SULFATES as mg./l.
SEABOARD COASTLINE RAILROAD
PROPERTY BOUNDARY
WOODROW WILSON STREET
ENTRY DRIVE
OFFICE
FILL
TREES
POND
DITCH
CHARLES AVENUE
BALL STREET
WASHINGTON STREET
PLANT STREET
N
T-10 110
T-9 1800
S-11 5600
S-10 51,000
S-8 580
S-9 180,000
T-8 13,000
S-1
S-3
S-4
T-7 5800
S-7 9300
S-5 17,000
T-6 4300
S-2
S-6 6100
T-5 3700
T-4 40
T-2 2200
T-3 2700
T-1 13
1,000
2,000
4,000
6,000
8,000
10,000
50,000
100,000
150,000
NAME: SCHUYLKILL METALS SITE-AERIAL 10/04/86
PLANT CITY, FLORIDA
FOR: SCHUYLKILL METALS CORPORATION
TITLE: CONCENTRATION OF SULFATES (as SO_4) IN SURFICIAL AQUIFER MONITORING WELLS, APRIL, 1987 (as mg./l.)
Woodward-Clyde Consultants
MADE BY TA
CHECKED BY TK
DATE 07/14/87
DRAWN BY JMcD
REVISIONS SITE MAP
DATE 07/14/87
FILE NO 85C5449
SCALE 0 80 160 200 320 IN FEET

-24-

FIGURE 14

concentrations in groundwater could be greatly effected by adsorption processes in the soils as well as by the sequestering effects of lead sulfide formation. The efficiency of the adsorption processes is controlled in part by the pH of waters as well as the amounts of clay and organic material in the soil.

Volumetric determinations of estimated amounts of contaminated media, shown below, were made for the following areas. These calculations were based on data obtained during field investigations.

- Process Area Soils/Debris - 54,500 cubic yards (cy) (soil - 36,000 cy) (battery casings - 18,500 cy)
- Perimeter Ditch Sediment - 500 cubic yards
- Surface Impoundment - 4.2×10^6 gallons
- Groundwater - 17.7×10^6 gallons

The above figures are minimum volumes for soil expected to need remediation since the possibility does exist that there are contaminated soils beneath the paved process area. Soils beneath this pad will be analyzed for total lead during remediation. Any soils having lead levels above the cleanup criteria will also be remediated. Verification sampling will be conducted to assure all the soil contaminated above the cleanup criterion is remediated.

Results from the RI showed that all areas on-site, including the soils, pond, ditch and marsh, showed some level of contamination as a result of the past operations at the site.

4.10 Wetland Impact Study

In September 1989, the Ecological Support Branch of EPA Region IV conducted a Wetland Impact Study at the Schuylkill Metals Corporation Site. The overall goal of the study was to provide the biological and chemical information necessary to evaluate the ecological hazards associated with the wetland contaminants. Field, laboratory, and evaluation studies were designed to provide information on:

1. The existing water quality of the wetland community as measured by biosurvey techniques.

2. The toxicity of wetland surface waters to aquatic organisms.

3. The toxicity of sediment samples and sediment elutriates to terrestrial and aquatic organisms under diverse environmental conditions.

4. The fate of the metals in the wetland system.

5. The existing level of metal bioaccumulation by indigenous plants and animals.

The study reported that virtually all the species tested demonstrated some degree of toxicity associated with the sediment elutriate. The report cautioned that these tests reflect worst possible conditions. No toxicity was observed associated with the canal surface water. In the vegetated marsh areas, algal growth was significantly retarded but not precluded. Only one surface water station in the vegetated marsh area demonstrated moderate toxicity to fathead minnows. No toxic effects were observed in the terrestrial plant test with surface water.

Of the metals assessed in the study, only iron and aluminum exceeded the National Ambient Water Quality Criteria. The report compared higher concentrations of metals present in the surface water during the May 1989 sampling to those found in September 1989. The difference is believed to be due to dilution of contaminants by rainwater during the September sampling event. Iron concentrations which remained elevated during September probably are the product of the sulfide regime associated with anaerobic sediments. Also, the concentration variance is due to irregular distribution of contaminants and the differences in exact sampling locations.

The study proposed changing the wetland's hydroperiod to a permanently flooded marsh condition. Under flooded conditions the wetland sediments become anaerobic with the overlying water column having a substandard level of dissolved oxygen. Under this condition, the sediments would be a likely source of sulfide which sequesters the metals as a metallic sulfide.

The study further cited biological data gathered by the National Oceanic and Atmospheric Administration (NOAA) which indicated a no effect level of 35 mg/kg of lead in the marsh sediments. The report concluded that trying to achieve this goal by excavation might result in a disruption of the anaerobic chemistry and result in the mobilization of lead, ultimately having a negative environmental impact on the marsh and downstream from the marsh.

5.0 SUMMARY OF SITE RISKS

The following discussion provides an overview of the baseline public health and environmental risk from the soils in the processing area, the pond and the ditch (Chapter 7.0, WWC, 1987). The risks associated with the marsh will be addressed in a separate section. This evaluation helps determine whether a remedial action is necessary by addressing the present risk, should no remedial action be taken.

5.1 Indicator Chemicals

The specific contaminants of concern selected for this particular site have been evaluated for their human carcinogenic and non-carcinogenic risk and environmental effects. The indicator chemicals are chosen to focus the assessment on the chemicals of greatest concern based on their frequency of detection, fate and transport, concentration and toxicity. The selected compounds and their media of concern for this site are as follows: soils - antimony, cadmium, lead; surface water - antimony and lead; and groundwater - antimony, chromium, lead and sodium.

5.2 Exposure Assessment

The exposure pathways for the site are presented in Table 1. At the present time, the surrounding population's water is supplied by Plant City and no known drinking water withdrawals occur in the shallow aquifer downgradient of the site. The processing area, holding pond, and perimeter ditch are fenced, decreasing the possibility of adults or children entering the site and ingesting soils or surface water. Both marshes were available to public access at the time of the exposure assessment. However, in developing the hypothetical exposure scenarios for the various media of concern at this site, it was assumed that nearby residents could be exposed to any contaminants on site. The possible future exposure routes if no action were taken include: ingestion of water from a well downgradient of the site; incidental ingestion of soils, surface water vegetation or wildlife on site; dermal adsorption of soils, surface water, or dusts; or inhalation of fugitive dusts. No modeling for exposure was performed.

5.3 Toxicity Assessment

None of the indicator chemicals are carcinogens via the oral exposure pathway with the exception of recent animal data for lead (see discussion below). Cadmium and chromium are potential carcinogens by the inhalation route and classified as B1 and A carcinogens, respectively. However, the risk of chromium inhalation is not considered significant at this site due to its presence in groundwater, not soils. The EPA has developed cancer potency factors (CPF) for estimating excess lifetime cancer risks associated with exposure to potential carcinogens. The CPF via inhalation for cadmium is 6.10 (mg/kg/d).

Chemicals exhibiting non-carcinogenic effects are assessed using risk reference doses (RfD) or, if unavailable, the Health Effects Assessment (HEA) developed by EPA. The acceptable intake for chronic exposure (AIC) and the acceptable intake for subchronic exposure (AIS) are used to describe the degree of toxicity of a chemical and are designed to be protective of sensitive populations. Exposures which exceed concentrations equivalent to these values would be unacceptable.

Recently, lead has been classified as a B2 carcinogen, but there are no Agency-approved CPF or RfD at this time. The main health effect of concern due to lead is neurotoxicity to children. Presently, the noncarcinogenic effects of lead are the primary concern, and will be the main consideration at this site until the Agency establishes specific limits based on carcinogenicity.

The health-based criteria for cadmium, chromium, and lead are listed in Table 2.

TABLE 1

MATRIX OF POTENTIAL EXPOSURE
PATHWAYS: BASELINE CONDITIONS
SCKUYLKILL METALS CORPORATION
PLANT CITY, FLORIDA

Release/ Transport Medium	Release Source/ Mechanism	Exposure Point	Primary Exposure Route(s)	Number of People Potentially Exposed	Pathway Completion Possible	Probability of Significant Exposure
Groundwater	Contaminated Soils and Fill, Contaminated Surface Waters/Site Leaching	Persons currently utilizing the shallow aquifer for drinking water	Ingestion	None; no with-drawals noted in the shallow aquifer downgradient of the site. Currently, downgradient residents are supplied with Plant City water	No	nil
		Future groundwater well users (shallow) downgradient from the site	Ingestion	Future use is unlikely to occur due to the availability of public water supply	Yes	nil to low
Soils	Contaminated Soils and Fill, Contaminated Surface Waters/Site Leaching and Surface Run-off	Persons consuming plants grown on-site or site wildlife	Ingestion	Unknown; very low	Yes	nil to low
	Contaminated Soils and Fill, Fugitive Dust Generation	Nearby residents	Ingestion, Inhalation, Dermal contact	Unknown; very low	Yes	nil to low
		Employees working at the site	Ingestion, Inhalation	Unknown; very low, currently, the site is vacant and access is restricted	No	nil to low
	Contaminated Soils and Fill, Tracking	Employees working at the site	Ingestion, Inhalation, Dermal contact	Unknown; very low, currently, the site is vacant and access is restricted	No	nil to low

TABLE 1

(continued)
MATRIX OF POTENTIAL EXPOSURE
PATHWAYS: BASELINE CONDITIONS
SCHUYLKILL METALS CORPORATION
PLANT CITY, FLORIDA

Release Transport Medium	Release Source/ Mechanism	Exposure Point	Primary Exposure Route(s)	Number of People Potentially Exposed	Pathway Completion Possible	Probability of Significant Exposure
Air	Contaminated Soils and Fill, Fugitive Dust Generation	Nearby Residents	Inhalation, Ingestion, Dermal Contact	100	Yes	nil to low
		Personnel on-site (Currently, the site vacant and accessed by authorized personnel)	Inhalation	30	Yes	nil to low
Surface Water	Contaminated Soils and Fill, Contaminated Surface Waters/Runoff and Groundwater Seepage	Persons eating waterfowl from marsh	Ingestion	Unknown, very low	Yes	nil to low
		Persons utilizing on-site surface water for drinking or industrial intakes	Ingestion	None; no intakes noted	No	nil to low
		Persons swimming or fishing in intermittent streams or its discharge points	Ingestion	Unknown	Yes	low

Table 2
Summary of Baseline Risk Characterization
for Groundwater and Soil

GROUNDWATER

Contaminant	Concentration (mg/kg) Min	Max	Mean	CDI (mg/kg/day) Maximum	Mean	AIC (Source)	CDI/AIC Mean	Maximum
Antimony		0.10	.005	2.86E-03	1.40E-04	4.00E-04 (RfD)	3.5E-01	7.15
Lead		0.17	.029	4.86E-03	8.29E-04	1.40E-03 (HEA)	5.9E-01	3.47
Chromium (3^+)		0.35	.04	1.00E-02	1.14E-03	1.00 (RfD)	1.1E-03	0.01
Chromium (6^+)		0.35	.04	1.00E-02	1.14E-03	5.00E-03 (HEA)	2.3E-01	2.00
						Hazard Index (HI)	1.17	12.63

SOIL

Contaminant	Concentration (mg/kg) Min	Max	Mean	CDI (mean) mg/kg/day yg child	adult	AIC (Source)	CDI/AIC yg child	adult
Antimony	4.1	4.8	5.9	1.3E-05	8.4E-08	4.00E-04	3.3E-02	2.2E-04
Lead	<0.2	593.2	51,000	1.5E-03	1.0E-05	1.4E-03	1.1	7.8E-03
Cadmium	<0.1	0.1	1.3	2.6E-07	1.7E-09	2.9E-04	9.0E-04	6.6E-06
						Hazard Index (HI)	1.1	8.0E-03

CDI: Chronic Daily Intake
AIC: Acceptable Intake for Chronic Exposure
RfD: Risk Reference Dose
HEA: Health Effects Assessment
HI: Hazard Index

5.4 Human Health Risk

This section quantifies the potential for adverse health effects due to site related chemical exposure. Non-carcinogenic health effects are quantified using the Hazard Index (HI) and are unacceptable if the HI exceeds one (1). The sum of the Hazard Quotient for each contaminant (HI value) is calculated for multiple contaminants that may be affecting the surrounding population or someone with access to the site. This number represents the estimated risk associated with a particular exposure route for non-carcinogens. Based on exposure levels found in the above toxicity assessment, EPA has determined that the potential for cumulative non-carcinogenic effects of the indicator chemicals does exist. These risk values associated with the indicator chemicals are quantified in Table 3.

The upper bound risk estimate for carcinogens is calculated using the CPF. Although cadmium is a potential carcinogen by the inhalation route, it has not been concluded that such a hazard exists by the oral route (ATSDR, 1987c, WWC, 1988). Risks for carcinogens representing an excess upper bound individual's lifetime cancer risk are acceptable between 10^{-4} and 10^{-6} under the National Contingency Plan (NCP).

5.5 Wetland Risk to Humans and Ecology

Both human and environmental risks were evaluated for the wetlands area. Due to the greater sensitivity of the ecological community to the contaminants of concern in the wetlands, the environmental impacts override the human health risks for the marshes. The risk evaluation for the SMC wetlands is based on a Wetlands Impact Study conducted on a similar wetland in the area.

5.5.1 Identification of the Wetland Contaminants of Concern

Most recent surface water analyses indicate that several metals were present above the National Ambient Water Quality Criteria (AWQC) and the Florida Class III Water Quality Standards in the marshes (Table 4). Lead and iron exceeded these standards in the west marsh surface water. Iron also exceeded the standards in the east marsh surface water. Zinc exceeded the Florida Standard in the surface waters of the west marsh and the AWQC in the east marsh. Arsenic was present in the east marsh surface water at a level representing a 10^{-4} risk of cancer for humans consuming fish from water at this concentration.

5.5.2 Exposure Assessment Summary for the Wetlands

The exposure pathways for contaminants in the marshes are evaluated for two possible receptors, human and environmental.

5.5.2.1 Human Exposure Pathways in the Wetlands

The exposure pathways for humans in the marshes are presented in Table 5. Potentially exposed populations are adults and

TABLE 3

CALCULATION OF CHRONIC HAZARD INDEX

EXPOSURE POINT: ON-SITE SURFICIAL AQUIFER

Chemical	CDI (1)	AIC (2)	CDI: AIC
Chromium	9.4E-03	5.0E-03	>1.0
Lead	4.8E-03	1.4E-03	>1.0

(1) CDI - Chronic Daily Intake
(2) Calculated values from Table 7.12
AIC - Acceptable Intake for Chronic Exposure

TABLE 4

Applicable Water Quality Criteria

	Florida Water Quality Stds (ug/l) Class III	General	Nat'l Ambient Water Quality Criteria (ug/l) Aquatic Life Criteria Maximum Concentration	Continuous Concentration	Human Health Consumption of Fish/Shellfish	Lowest Observed LC_{50}	ChV
PARAMETER							
ALUMINUM			750	87			
ARSENIC		50	III 360	III 190	0.14*		
BARIUM		50					
BERYLLIUM	11(a);1,100(b)				0.117*	160	5.3
CADMIUM	0.8(a);1.2(b)		e(1.128(1nH)-3.828)	e(0.7852(1nH)-3.49)	10MCL		
CHROMIUM		50					
			III e(0.819(1nH)+3.688)	e(0.819(1nH)+1.561)	3,433,000		
			VI 16	11	50 MCL		
COPPER	30		e(0.9422(1nH)-1.464)	e(0.8545(1nH)-1.465)	1000o		
LEAD	30		e(1.273(1nH)-1.46)	e(1.273(1nH)-4.705)	50 MCL		
ANTIMONY					4308	13,000	1600
ZINC	30		e(0.8473(1nH)+.8604)	e(0.8473(1nH)+.7614)	5000o		
MANGANESE					30 MCL		
MERCURY	0.2		2.4	0.012	0.153		
NICKEL	100		e(0.846(1nH)+3.3612)	e(0.846(1nH)+1.1645)	4584		
SELENIUM	25		20	5	10 MCL		
SILVER	0.07		e(1.72(1nH)-6.52)[d]				
CALCIUM							
MAGNESIUM							
IRON	1000			1000			
SOD[illegible]							
POT[illegible]M							
THA[illegible]					48	1400	57
DISS[illegible]ED OXYGEN	>5 mg/L						
AMMONIA (NH_3)	20		c	c			
ALKALINITY	>20 mg/L						
CHLORIDE (MG/L)			860	230			
NITRATE					10000 MCL		
SULFIDES							

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FOOTNOTES*

J - ESTIMATED VALUE
NA - NOT AN ANALYTE
* - AT A 10^{-6} CANCER RISK LEVEL
H - HARDNESS IN mg/l as $CaCO_3$
o - BASED ON TASTE AND ODOR
III - TRIVALENT FORM OF METAL
VI - HEXAVALENT FORM OF METAL
MCL - CRITERIA SET EQUAL TO MAXIMUM CONTAMINANT LEVEL
a - FOR WATER WITH A HARDNESS OF ≤150 mg/L as $CaCO_3$
b - FOR WATER WITH A HARDNESS OF >150 mg/L as $CaCO_3$
c - FUNCTION OF pH, TEMPERATURE
d - NOT TO BE EXCEEDED VALUE

TABLE 5

EXPOSURE SCENARIOS
WETLAND AREA

MEDIUM	TRANSPORT MECHANISM	EXPOSURE POINT	ROUTE	EXPLANATION
Ground Water (shallow)	None	Nearest Receptor (hypothetical well)	Ingestion Inhalation Dermal	Meets EPA MCLs & FLDER Standards; addressed.
Ground Water (Floridan)	None	Nearest Receptor	Ingestion Inhalation Dermal	Meets EPA MCLs & FLDER Standards; addressed.
Surface Water	None	Marsh	Ingestion	Not feasible exposure scenario; no addressed.
			Dermal	Recreational activities; addresse
			Bioaccumulation	refer to Aquatic Life Toxicology section of the Risk Assessment.
	Volatil-ization	Nearest Receptor	Inhalation	Inorganics are not volatile; addressed.
Sediments	None	Onsite	Dermal Ingestion	Possible Scenario; addressed. Possible scenario children 2-6; addressed.
	Volatil-ization	Nearest Receptor	Inhalation	Inorganics are not volatile; not addressed.
Surface Soils	None	Nearest Receptor	Inhalation Dermal Ingestion	No samples; not addressed.

children residing in or frequenting the area. Under current site conditions, it was determined that a viable route of human exposure to the contaminants of concern was through the ingestion of beef from cattle foraging in the west marsh. Other exposure pathways include dermal exposure to marsh surface water or sediments and ingestion of marsh sediments. However, the marshes have fluctuating water levels with the highest level in the west marsh being unsupportive of recreational swimming. Another factor reducing the potential for human exposure in the west marsh is the dense vegetation and limited area of open water. Access to the east marsh is inhibited by the fence and tall dense vegetation. Potential for human ingestion of fish is considered minimal since fish were not observed during the September 1989 investigation. Other potential exposure pathways were evaluated, such as ingestion of surface water, inhalation of vapors from surface waters or sediments. Since the indicator chemicals were inorganic and hence nonvolatile, these pathways were determined not to be viable exposure pathways.

5.5.2.2 Environmental Exposure Pathways in the Wetlands

Aquatic biota may be exposed via contaminated surface water and sediments. The Wetlands Impact Study indicates that there is a potential for flora and fauna to bioaccumulate the metals.

5.5.3 Summary of the Aquatic Toxicity Assessment: East Marsh

The biosurvey indicated that the community of benthic macroinvertebrates associated with the canal and surrounding wetland area are restricted in diversity.

Only the stations in the vegetated wetland surrounding the canal showed some degree of toxicity associated with surface water. In these marsh samples algal growth was significantly reduced but not precluded.

No toxicity associated with the contaminated sediments was detected in the representative population. However, toxicity was observed associated with the sediment elutriate studies performed on a variety of representative organisms.

5.5.4 Environmental Summary

The impact of contaminants on aquatic biota is characterized in this evaluation since exposures associated with surface water and sediments at SMC are a potential environmental risk. The chemical of concern for the pond, ditches, and the marsh is lead. Iron, zinc, mercury, and arsenic have also been identified at elevated levels in the surface waters of the marshes. Wetlands are potentially a habitat for a variety of invertebrates, amphibians, reptiles, fish, and birds. Endangered species have not been observed at the SMC site.

The flora is diverse and in the east marsh is dominated by wetland species such as primrose willow, Carolina willow, and a large stand of mild water-pepper. The west marsh has some

willow shrubs; however, dominating vegetation is mild water-pepper, giant bristlegrass, and cattail.
Lead has been found to bioaccumulate in a variety of aquatic species. Lead has also been found to be more available for bioaccumulation in low pH waters such as those that exist on this site.

Excavation of the marsh sediment or engineered inundation of the marsh sediment decreases the risk of heavy metal bioaccumulation in the long-term. Sediment entrainment by surface water is the most likely mode of contaminant distribution from the process area to the marsh. There is little likelihood of significant contaminated sediment transport beyond the confines of the marsh. Surface water runoff is not expected to result in extensive transport of sediments.

5.5.6 Environmental Risk Conclusions

The Wetlands Impact Study concluded that the contaminated sediments are having a negative impact on the ecology of the marsh. The study concludes that a biologically safe level of lead in the sediments would probably be in the range of 35 to 60 mg/kg. However, the report also states that trying to achieve this cleanup goal in the marsh might result in the mobilization of lead, ultimately having a greater negative environmental impact on the marsh. To attain this cleanup level, all of the east and west marsh sediments would need to be excavated. For the east marsh this would be overprotective, considering that a resulting mitigation plan may not attain the level of diversity presently existing at the east marsh.

The routes by which the SMC site impacts the wetlands is through surface water transport and groundwater flow. Water flows from the processing area where the battery components are buried to the wetlands, providing a pathway for metal transport into the wetlands. Remediation of soil contamination will reduce the input of lead to the wetlands by removing the source of lead.

Finally, the Wetland Impact Study recommended changing the east wetland's hydroperiod from a semi-permanently flooded marsh system to a permanently flooded marsh system. Under flooded conditions the wetland sediments shall become anaerobic with the overlying water column often having a reducing environment. The sulfur bacteria in the sediments reduce sulfate to sulfide which reacts with most heavy metals to form a metallic sulfide. Anaerobic or reduced conditions in the sediments will cause the metals to be sequestered and will reduce the potential for migration of metals. No such recommendation was given for the west marsh, since inundation was not feasible.

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.

6.0 DESCRIPTION OF ALTERNATIVES

The major objective of the feasibility study (FS) was to evaluate possible actions which could remediate the site. First, appropriate technologies were identified for the containment, collection, and treatment of the contaminated soils. Different methods for surface water and groundwater treatment and handling of debris were also examined. These technologies were initially screened based on site and contaminant characteristics, then further screened based on effectiveness, implementability, health risk, and cost. Technologies which satisfied the screening requirements were combined to form remedial action alternatives.

6.1 Soil, Pond, Ditch, and Groundwater Alternatives

The feasibility study described sixteen alternatives that would be appropriate to remediate this site. However, the alternatives included only five different methods of soil remediation in combination with various methods of the collection and treatment of surface water and groundwater and disposal of battery casing debris (separated from the soils). The 16 feasibility study alternatives are combined and presented as 5 alternatives in this ROD (Table 6).
In this document, only the five soil remediation methods will be considered as separate alternatives, since all appropriate methods of groundwater and surface water collection and treatment and debris handling can be used in conjunction with each of these alternatives. Each of the five alternatives for soil remediation and the options for debris handling are described below. Surface and groundwater treatment methods are examined in Section 6.1.6.

6.1.1 Alternative 1 - No Action

An evaluation of the no-action alternative is required to be considered by the National Contingency Plan (NCP). It provides a baseline for comparison of other alternatives. Under the no-action alternative, no remedial actions would be undertaken at the site at the present time. Long term groundwater monitoring would be used to detect the potential occurence of contaminant migration off-site. Existing wells would be used. Total present worth cost is estimated at $557,000.

6.1.2 Alternative 2 - Containment

The containment option has two components: a slurry wall and a surface cap to contain the contaminated soil debris in the source area. This alternative would minimize leaching and horizontal migration of contaminants to the surficial aquifer and eliminate the possibility of discharge to surface waters either from groundwater or surface water runoff. The entire process area would be surrounded by the low slurry wall in a trench 3 feet wide by 25 feet deep. This wall would be approximately 2,000 feet long. The RCRA-type cap would consist of layering three (3) feet of compacted clay, a plastic liner, geotextiles, geonet (for drainage) and top soil to support vegetation.

Table 6

Remedial Alternatives

ROD Alternative	FS Alternative	Remedial Action Alternative Description
1	1	No Action
2	2, 3, 4, & 5	Containment by surface cap and slurry wall
3	6 & 7	Source removal; soil and debris to offsite landfill disposal; and, backfill and regrade excavated area
4	8, 9, 11, 12, 14 & 15	Source removal; soil and debris separation; chemical fixation of soil; and, onsite replacement variations: pond backfilled pond left intact debris recycling debris incineration debris landfill
5	10, 13, & 16	Source removal; soil and debris separation; and, heap leaching of soil variations: debris recycling debris incineration debris landfill

Existing site buildings will be razed; this area will be included with the process area to be capped. The approximate area to be capped would be 200,000 square feet. The time to implement this alternative is estimated to be three to six months. Total present worth cost is estimated to range from $3,143,000 to $5,442,000 for the RCRA cap.

Long-term operation and maintenance includes periodic mowing, inspection for erosion, and some repairs to insure integrity of the cover. Potential for future exposure from leachate would be limited, but continued groundwater monitoring would be required. Future development of the site will be limited. Deed restrictions would restrict the site to non-residential use.

6.1.3 Alternative 3 - Source Removal/Off-Site Disposal

This alternative consists of excavating the contaminated soil and debris, loading it onto trucks and hauling it to an approved RCRA Class I landfill. Upon excavation, trenches will be constructed within the source area. After excavation, clean backfill material will be placed in the excavated area and regraded. This method would meet the cleanup criteria. Excavation and disposal off-site would remove the potential for future off-site migration of leachate by surface and sub-surface routes. The excavation would cover an area of approximately 170,000 sq ft, including the actual process area. Confirmatory sampling beneath existing concrete pads will be performed.

It is estimated that depths of excavation for soils and debris will range from 3 to 8 feet below ground surface. Excavation will take place until soils with lead concentrations below the cleanup criteria are reached. Confirmatory sampling will ensure that soils contaminated above the cleanup goal are removed and treated. Based on information gathered during the field investigations, it is anticipated that approximately 54,500 cubic yards of material will require excavation. The excavated areas will be backfilled with clean fill. Excavated soils and debris will be transported to a RCRA Subtitle C - permitted landfill in Pinewood, South Carolina for disposal.

Excavation below the water-table will require the construction of three dewatering trenches. The trenches will be excavated 100 ft apart, range from 290 to 510 feet in length and be approximately 12 feet deep. At the surface the trenches will measure 12 feet and narrow to 5 feet near the base.

The excavation and transportation of the hazardous material are expected to each require three (3) months to implement. Time required for disposal at a Subtitle C - approved landfill depends on the facility. Long-term operations and maintenance are mowing and a monitoring program. Total present worth cost is estimated to range from $16,425,000 to $18,500,000. This range depends on the groundwater treatment method.

6.1.4 Alternative 4: Source Removal/On-Site Treatment of Soils (Fixation)

This alternative consists of excavation of contaminated soils and debris, separation of debris from soils, chemical fixation of soils and treated soil replacement. A treatability study for the chemical fixation process has been conducted. The results from the study have been used to selected a fixant combination that, when mixed with the contaminated soils, will immobilize the contaminants and minimize the threat of future leaching into the groundwater. Thus, the source of groundwater contamination will be removed.

As in Alternative 3, it is anticipated that 54,500 cubic yards of material will require excavation. It is estimated that this will consist of 18,500 cubic yards of battery casings and 36,000 cubic yards of soils. As in the above alternative, the soil would require hazardous characteristic testing. The debris will be separated from the soils by screening and handled by one of the three options as described below:

A. Off-site Landfill

In this method of debris disposal the material is transported and disposed in a RCRA Subtitle C - approved landfill. The time estimated for implementation is 3 months. The total present worth cost for this alternative with landfill disposal of debris ranges from $8,469,000 to $10,766,000.

B. On-site Incineration

Rotary kiln incineration would be used to treat the excavated debris. The standard incineration process using a rotary kiln will yield some ash which will require hazardous characteristic testing prior to being disposed at an appropriate facility. This is estimated to require three months for debris incineration. The total present worth cost for this alternative with debris incineration ranges from $6,768,000 to $9,064,000.

C. Off-Site Recycling

A third alternative method of handling the debris screened from the soil is recycling. The debris is reduced to approximately one-half inch diameter chips and washed before transport to an EPA-approved recycling firm. The screening process and the grinding and washing each will take approximately 3 months.

Soils will be stored on a temporary storage pad. Construction of this pad shall entail placing a clay layer over a plastic membrane large enough to store 1,000 cubic yards of soil at a depth of 5 feet. At the pad, the soils will be combined with the fixant(s). After mixing on-site, the mass will be tested for compressive strength, homogeneity, and Toxic Characteristics (TC) to assure performance criteria and RCRA requirements have been met. The fixed material will then be replaced in the excavated areas; any remaining empty volume will be backfilled with clean fill.

Estimated time for implementation is 3 months each for excavation and screening. Chemical fixation requires approximately 100 days. Long term operation and maintenance will require mowing, site maintenance, and a monitoring program. The total present worth cost for Alternative 4 and debris recycling is estimated to range from $5,864,000 to $8,161,000.

6.1.5 Alternative 5: Source Removal/On-Site Treatment of Soils (Heap Leaching)/Off-Site Lead Recovery

This alternative consists of excavating the contaminated soils and debris, screening the debris from the soils, heap leaching of the soils (soil washing), site restoration, and smelter recovery of lead from the leach lead cake.

Source material will be excavated and debris will be screened and remediated, as described in Alternative 4.

Heap leaching, or soils washing, will be performed on the soils as they are excavated. A temporary storage pad will hold this soil, approximately 9,000 cubic yards, for treatment. Spray equipment will distribute a heap leach solvent over the 10 ft high pile. This metal-extracting solvent will then be collected after percolating through the soil pile in a storage pad drain.

The lead will be extracted (approximately 95% recovery) from the solvent, thickened, dried, and sent to a smelter. The collected solvent will be recycled until spent. Sampling of soils will determine the final treatment pass and will meet the standards approved by the EPA and FDER.

A non-hazardous solvent will be added to the soils to destroy the heap leaching solvent. Verification sampling of this soil will be done to insure clean-up criteria is met. On-site backfilling and regrading will proceed with additional fill if necessary.

A pilot study will be required to provide data on the feasibility of heap leaching these soils.

As estimated for the previous alternatives, the time for implementation is approximately 3 months for excavation, screening, and disposal. Heap leaching will require 12 to 18 months. Operation and maintenance after remediation will be similar to any of the other alternatives involving backfilling, regrading, and revegetating, i.e. a mowing and monitoring program. The pilot study time would require a few months.

Once segregated from the soils, the battery casing debris will be handled by one of the three methods described for

Alternative 4. The estimated total present worth cost for heap leaching of soils combined with landfilling the debris ranges from $9,334,000 to $11,230,000, with incinerating the debris ranges from $7,633,000 to $9,064,000, and with recycling the debris ranges from $6,729,000 to $8,625,000.

6.1.6 Surface Water and Groundwater Remediation

Both surface water and groundwater quality at the SMC site have been affected by past disposal practices. Lead concentrations in the holding pond were found to be as high as 1,300 mg/L. Generally, lead concentration in the groundwater is below 0.040 mg/L, except immediately northeast of the holding pond where it ranges between 0.13 and 0.17 mg/L. Remediation of the groundwater shall include recovery of groundwater from the effected areas and subsequent treatment.

Groundwater treatment will address lead and chromium contamination. The volume of contaminated groundwater cannot be precisely calculated due to fluctuations from stormwater percolation, soil porosity, and the topography of the surficial confining unit. However, the estimated volume of contaminated groundwater is approximately 17 million gallons.

6.1.6.1 Surface Water and Groundwater Recovery

Due to the relatively thin (10 feet in mid-1987) saturated thickness of the surficial aquifer, use of wells for groundwater recovery is not an efficient method for recovering contaminated groundwater. Rather, the existing holding pond, supplemented with an infiltration trench excavated in the most contaminated part of the surficial aquifer, will allow recovery of the affected ground water.

6.1.6.1.1 Holding Pond and Infiltration Trench

The holding pond is excavated into the surficial aquifer and thus is hydraulically connected with it. Multiple rounds of water level measurements indicate that groundwater flows radially, away from the pond due to local groundwater mounding. During the early stages of groundwater remediation, the holding pond will be emptied by pumping pond water to the treatment system described below and ultimately to one of the following: the Plant City publicly owned treatment works (POTW); recirculated to on-site wetlands; or to the aquifer to promote flushing. The permitting requirements will be met for any of these discharge options. Lowering the level of the pond water is expected to cause reversal of the groundwater gradient, inducing groundwater to flow to the pond. The emptied pond will be backfilled with clean sand and capped with low permeability material. A large diameter well will be installed in the north central part of the backfilled pond to permit continued recovery and treatment of the affected groundwater.

An infiltration trench trending in a northeasterly direction will be excavated near the northeastern corner of the holding pond. The length will be approximately 320 feet and will be excavated to the confining unit, a depth of approximately 15 feet. A perforated collection pipe will be installed at the base of the trench prior to backfilling the trench with sand.

It is estimated a static flow rate of 50 gallons per minute (gpm) is planned for the pond water and groundwater system. The trench will be pumped at an approximate static rate of 20 to 25 gpm to a 10,000 gallon storage tank. With both units operating the flow rate is estimated to be 75 gpm.

6.1.6.2 Surface Water and Groundwater Treatment

During development of the remedial alternatives for the SMC site three processes were considered for treatment of the recovered surface water and groundwater. The water produced during soil excavation prior to remediation will be treated by one of the processes described below.

The first alternative includes chemical precipitation of metals followed by ion filtration. The second alternative involves electrochemical precipitation followed by clarification and multimedia filtration. The third groundwater treatment process evaluated was electrochemical precipitation followed by microfiltration.

Each treatment unit will be sized for a flow rate from the holding tank of 75 gpm. The influent lead concentration for design purposes was established as 1.5 mg/L. The treatment methods proposed are capable of treating the waste to meet the state of Florida Drinking Water Standards (DWS). Treatability studies will be required to determine the efficiency of the proposed treatment technologies.

It is reasonable to assume a construction and start-up time of six months for each of the methods. The treatment plant can easily be located on-site.

6.1.6.2.1 Ion Filtration

Groundwater recovered from the converted pond, infiltration trenches and the dewatering trenches will be pumped to a 10,000 gallon storage tank where chemicals will be added to prolong filtration cycles and prevent binding of the filter cloth on the filter press. In addition, caustic soda and agents to promote floc formation will be added to promote the formation of a lead hydroxide precipitate and co-precipitate the lead. The specific agents to be used will be determined following treatability testing. Following precipitation and flocculation of metals, the process will remove suspended solids by sand filtration prior to removal of the remaining solubilized lead and sulfates by ion filtration. Solids generated during the filtration process will be fixed in the same manner site soils shall be.

The ion filtration process is based on passing metal-contaminated water through a medium that selectively binds cations. The medium removes metal ions and tends to neutralize the treated water. Ion filtration does not produce sludges; however, after the filtration media become saturated and incapable of collecting additional metals, the spent media must be disposed. The medium will have to be landfilled in a RCRA Class I landfill or chemically fixed and landfilled.

Bench and pilot scale testing will be necessary for this and the other technologies discussed below. This testing will determine treatability, size, loading, and other design parameters. This method will achieve the cleanup goals for the lead contaminating the groundwater by treating it to levels which meet the disposal requirements. This treatment system is anticipated to meet a "best available technology economically feasible" criteria. Construction of this system will be simpler than the two other technologies described. Once flow rate is established, filtration is continuous. Operation and maintenance (O & M) involves checking flow rates, mechanical conditions and pressures in addition to sampling the influent and effluent. O & M will be relatively simple, requiring only two hours a day for oversight.

6.1.6.2.2 Electrochemical Precipitation and Clarification

Water from the 10,000 gallon storage tank is adjusted to between 8.0 and 8.5 pH units prior to pumping into an electrochemical cell where lead and iron hydroxide co-precipitate. From the electrochemical cell, precipitate-bearing water is transferred to a clarifier for separation of the precipitate. Coagulants are added in the clarifier to promote sludge formation. The sludge formed is dewatered and transported to an approved RCRA Class I landfill. Additional multimedia filtration is required to remove the precipitate which did not settle out during clarification.

Monitoring will be done frequently during the initial start-up and less frequently after four months. In addition to water samples, the sludge will be tested for TCLP extraction of lead as well as total lead. This will determine its status as a hazardous material and whether enough lead is present to be recovered economically in the smelter. Operation and maintenance for this option would require four man-hours a day and would include routine monitoring of the system (daily), sludge removal from the filter press (weekly) and sampling (bi-weekly).

6.1.6.2.3 Microfiltration/Electrochemical Precipitation

As with electrochemical precipitation and clarification, this process requires pH adjustment and electrochemical precipitation. After precipitation, the process differs in that the water is routed to a recirculation/equalization tank where a coagulant is added. Water then is routed to microfiltration vessels for solids removal prior to routing the water for final disposal either off-site or onsite. Clarification is not required in this process, since floc size need only be large enough to be screened out. Sludge production will be approximately 1 - 2 ft^3/d. Sampling would be done as described in the process described for electrochemical precipitation and clarification.

Pumping and treatment may require from six to nine months for construction and implementation; however, before the desired results are observed, it is expected that a minimum of five years of continued O & M is necessary. Long term operation and maintenance will require culvert cleaning, and pump and piping replacement.

Discharge of treated water to the Plant City POTW is the preferred disposal option and will likely be allowable following POTW review of SMC's treatment verification and water volumes. However, if all water cannot be routed to the POTW, other options, including discharge under a National Pollution Discharge Elimination System (NPDES) permit and re-injection will be pursued. The NPDES permit would set specific contaminant discharge limits for the discharged waters. The decision will depend on the degree of groundwater treatment. Any change from the selected option will require public notification, pursuant to Section 117 of SARA.

6.2 Wetland Alternatives

The wetland alternatives were evaluated in the Addendum to the Feasibility Study. A detailed analysis of appropriate technologies were screened for their use at the SMC site and four alternatives were identified. The alternatives are described below.

6.2.1 No Action Alternative

CERCLA §300.430 (e)(6) requires that the no action alternative be considered at every site. Under the no action alternative, EPA would take no further action in the wetlands to control or remediate contamination therein. The no action alternative implies leaving the site in its present condition without disturbing contaminated sediments. However, physical, chemical, and biological monitoring would be performed over a period of 30 years in this alternative. A public health assessment would be performed every five years to evaluate potential changes in risk associated with no action.

Potential health risks would remain associated with current conditions. This alternative exceeds EPA's acceptable target risk range and does not attain ARARs.

The estimated present worth cost of this alternative is $608,000.

6.2.2 Mechanical Controls Alternative

The mechanical controls alternative consists of placing barriers to restrict access to contaminated soils and sediments within the wetlands. The western and eastern marsh areas would be approached differently due to different environmental and human receptor exposure potentials. The western marsh mechanical control would consist of the construction of a fence to restrict cattle access to the marsh area from adjacent pasture. The FS Addendum for the wetlands did not consider fencing for the eastern marsh because access by cattle is already limited by site conditions and its location.

The mechanical controls in the eastern marsh include placement of a flood control mechanism at the outlet of the eastern marsh to ensure inundation. This is not considered for the western marsh because of its isolation and lack of surface water flow into it. The alternative, as it applies to each marsh, is described below in the following sections.

There is a possibility that, by leaving contaminated sediments in the marsh, the AWQC for surface water may be exceeded. The conclusion of the Wetland Impact Study stated that if the marsh was permanently flooded, the hazardous metals in the sediments would remain under anaerobic conditions and would be chemically bound and sequestered in the sediments. This would greatly decrease the potential for metal transport from the sediments to the surface water. In order to select this alternative a waiver of the AWQC is required. The waiver is justified by the potential negative environmental impact that could be created by trying to excavate the contaminated marsh sediments, which involves complete destruction of the wetland and potential mobilization of lead beyond the site area (CERCLA 121(d)(4)(B)). This waiver will not apply to the treated waters discharged to the marsh surface waters. EPA did not identify this waiver in the Proposed Plan; however, this waiver does not significantly alter the scope, performance, or cost of the remedy.

Federal Executive Order 11990, Protection of Wetlands, requires federal agencies in carrying out their responsibilities to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

Section 404(b)(1) of the Clean Water Act also requires that practicable steps must be taken to minimize adverse impacts to wetlands from fill. In the case of this alternative, the contaminated sediments remaining in the marsh will continue to impair the biological productivity and diversity of the wetland ecosystem. To minimize the effects of this impact, mitigation is required to created new areas of wetlands that will replace the functions lost in the onsite wetland. A specific mitigation plan will be developed as part of the Remedial Design and in accordance with the EPA regional mitigation guidelines.

6.2.2.1 West Marsh

This alternative would involve installation of a fence to enlarge the existing fenced area surrounding the SMC site. The fence would consist of approximately 400 feet of a 3-strand barbed wire fence, four feet in height, between the cow pasture and the western marsh. This should deter passage of humans and cattle.

Potential health risks by ingestion of marsh sediments and surface water would remain, since access is not completely or permanently prevented. Wildlife use of the marsh will not be entirely inhibited. This alternative may exceed the surface water ARARs; however, this may be temporary.

O&M would consist of fence repair, and monitoring of water and sediment quality and biological systems. The total estimated present worth cost for the west marsh mechanical control alternative is $214,000.

6.2.2.2 East Marsh

This alternative would involve utilizing a flood control measure at the outlet of the eastern marsh. The flood control would consist of a fixed weir and associated supporting berm constructed at the outlet of the eastern wetland. Height of the weir would be determined during design; however, for cost calculation purposes the FS Addendum estimated an elevation of approximately 115 feet based on the topography of the eastern wetland.

In addition, the present onsite perimeter ditch will be diverted to the eastern wetland to increase the supply of surface water input and ensure inundation. Diversion will depend upon the concentrations of contaminants in the ditch, as well as onsite soil and groundwater remediation activities.

A hydrologic study shall be performed prior to design of the weir which will ensure the effectiveness of controls in achieving continual surface water inundation over the east marsh.

The monitoring program for this alternative would follow the same procedure as that proposed for the no action alternative. However, emphasis would be placed on hydraulic monitoring to assess whether the model correctly estimated water elevations. In addition, plant community monitoring is required to assess any changes in community restructuring.

Need for restoration of approximately one acre of wetlands in the east marsh is expected due to potential impacts from construction activities.

The total estimated present worth costs, including O&M, for the east marsh mechanical control alternative is $674,000.

6.2.3 Low Permeability Cover and Solidification Alternative

This alternative was evaluated for both wetlands on the SMC site in the FS Addendum. The low permeability (clay) cover requires placement of clay and topsoil over solidified contaminated sediments. It is estimated that the upper four feet of marsh sediments would have to be solidified in order to achieve cap stability. However, the actual depth must be determined during the remedial design, and is based on contamination depth and composition of sediment. Following preparation of the subgrade, a one-foot clay liner, a one-foot drainage layer, and six inches of topsoil would be placed in both marshes. If necessary, drainage diversion features, such as cover grading and culvert modification would be constructed to promote runoff of surface water.

Operation, maintenance, and monitoring of the cover system would be performed for a period of 30 years.

Section 404(b)(1) of the Clean Water Act also requires that practicable steps must be taken to minimize adverse impacts to wetlands from fill. To achieve no net loss of wetlands, and to minimize the adverse effects of filling at the site, mitigation is required. This involves replacing lost wetlands at the site by creating or restoring a wetland area. A site specific mitigation plan will be developed as part of the Remedial Design and in accordance with the EPA regional mitigation guidelines.

6.2.3.1 West Marsh

Solidification of approximately 10,200 cubic yards (cy) of sediment would be required in the west marsh. Cap construction is estimated to cover the entire marsh, also estimated at 7,085 square yards (sq yd).

The total present worth cost for this alternative in the west marsh is estimated to be $978,000, including a 2:1 ratio wetland mitigation of $110,000 and operation and maintenance for cover and mitigated wetlands of $40,400.

6.2.3.2 East Marsh

Solidification of approximately 31,000 cy of sediment/soil would be required in the east marsh. Cap construction is estimated to cover an area of 29,350 sq yd, which is the approximate area of the entire marsh.

The total present worth cost for this alternative in the east marsh is estimated to be $3,255,000, including a 2:1 ratio wetland mitigation of $275,000 and operation and maintenance for cover and mitigated wetlands of $181,600.

6.2.4 Sediment Removal Alternative

This remedial alternative consists of excavation of sediments and soils exceeding specific lead concentrations. The FS Addendum evaluates this alternative for a variety of lead concentrations and assumes a depth of two feet is adequate to remove the contaminated sediments. A range of lead concentrations were used to determine relative cost. However, soil cleanup criteria is the overriding factor of soil depth removal. The soil and sediment would require hazardous characteristic testing to determine whether the soil would be considered hazardous under the Land Disposal Restrictions. Removed sediments will be solidified and disposed onsite or offsite at a RCRA landfill. Regrading the site to original contours, such as restoring historical wetland features, or backfilling the excavated wetland will be performed following wetland excavation. Treatability or bench-scale studies are necessary to determine the most appropriate mixture for the SMC site.

An extensive chemical, physical, and biological monitoring program similar to that described in the no action alternative would be performed biannually for 5 years. The creation, maintenance, and monitoring period of the wetland would be for thirty years.

There is a possibility that in selection of a safe clean-up goal for contaminated sediments in the marshes, the AWQC for surface water may be exceeded by any remaining contaminated sediment. In order to select this alternative a waiver of the AWQC is required. The waiver is justified by the potential negative environmental impact that could be created by trying to excavate the remainder of the contaminated sediments, which involves complete destruction of the wetland and potential mobilization of lead beyond the site area (CERCLA 121(d)(4)(B)).

Federal Executive Order 11990, Protection of Wetlands, requires federal agencies in carrying out their responsibilities to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

Section 404(b)(1) of the Clean Water Act also requires that practicable steps must be taken to minimize adverse impacts to wetlands from fill. One type of minimization is compensatory mitigation to achieve no net loss of wetlands, and to minimize the adverse effects of this impact. This type of mitigation involves replacing wetlands lost at at the site by creating or restoring a new wetland area. In the event contaminated sediments remain in the marsh, they will continue to impair the biological productivity and diversity of the wetland ecosystem. Mitigation is required to create new areas of wetlands that will replace the functions lost in the onsite wetland. A site specific mitigation plan will be developed as part of the Remedial Design and in accordance with the EPA regional mitigation guidelines.

6.2.4.1 West Marsh

Transport and disposal is estimated for 4,700 cy of material in the west marsh. The same amount of fill is estimated in the event that the wetland would be backfilled during restoration of the entire site to historical topography and contaminated material will be disposed offsite. Backfill is estimated to be 9,900 cy for onsite disposal of contaminated material (non-wetland area).

Cost evaluations for this alternative are performed on the assumption that the entire marsh will be excavated. Total present worth cost, including operation and maintenance, for this alternative in the west marsh is estimated to be $2,664,000 for offsite disposal and restoration of entire site to historical topography; $2,572,000 for offsite disposal and restoration of present wetland; and $545,000 for onsite disposal and restoration of present wetland.

6.2.4.2 East Marsh

This alternative for the east marsh evaluates removal of the marsh sediment exceeding lead concentrations of 110 mg/kg and 350 mg/kg. Removal of sediments exceeding the lower concentration would be equivalent to removing sediments within the entire wetland to a depth of two feet. Removal of sediments exceeding the 350 mg/kg lead concentration would limit removal to a portion of the marsh.

East marsh sediments exceeding 110 mg/kg are estimated at 15,600 cy. Sediments will be excavated and solidified and require the same amount of backfill. Sediments exceeding 350 mg/kg are estimated to total 8,400 cy. Sediments will be excavated and solidified and require the same amount of fill.

Total present worth cost, including operation and maintenance, for this alternative in the east marsh is estimated to be $8,411,000 for excavation of sediments exceeding 110 mg/kg lead, offsite disposal and entire site restoration; $4,828,000 for excavation of sediments exceeding 350 mg/kg, offsite disposal and entire site restoration; $5,452,000 for excavation of sediments exceeding 110 mg/kg lead, offsite disposal and east marsh restoration; $4,676,000 for excavation of sediments exceeding 350 mg/kg lead, offsite disposal and east marsh restoration; $1,641,000 for excavation of sediments exceeding 110 mg/kg lead, onsite disposal and east marsh restoration; and $1,047,000 for excavation of sediments exceeding 350 mg/kg lead, onsite disposal and east marsh restoration.

7.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

All alternatives were evaluated based on the following nine criteria.

Threshold Criteria which each alternative must meet criteria to be eligible for selection:

1. Overall protection of human health & the environment; and,

2. Compliance with all federal & state applicable or relevant appropriate requirements (ARARS).

Primary Balancing Criteria which evaluate tradeoffs among threshold criteria based on the following criteria:

3. Long term effectiveness and permanence;

4. Short term effectiveness;

5. Reduction of toxicity, mobility or volume through treatment;

6. Implementability; and,

7. Cost.

Modifying Criteria will also be considered:

8. State acceptance; and

9. Community acceptance.

A summary of the relative performance of the alternatives in the FS and the FS Addendum with respect to each of the nine criteria is provided in this section.

7.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

7.1.1 Soils, Pond, Ditches, and Groundwater Alternatives

Alternative 1 does not provide protection to human health or the environment so it will not be addressed further in the selection of alternatives.

All of the remaining alternatives, including containment, disposal or treatment of contaminated soils would prevent further surface or groundwater contamination; existing contamination of surface water and groundwater would be removed through treatment. Thus, each of these alternatives would be protective of human health via the water ingestion pathway.

Alternative 2 would provide adequate protection of human health due to ingestion and inhalation of the contaminants in the soil (through use of contaminant containment). A reduction in mobility of contaminants is provided through containment. There is the potential for continued migration of contaminated groundwater; however, institutional controls within this alternatives provide protection against risk from contaminated groundwater ingestion. Dermal contact during remediation should be prevented by appropriate safety measures.

Potential for off-site exposure to site-related contaminants would diminish with isolation of the source by reducing the mobility of contaminants. By minimizing contaminant migration in the surficial aquifer and eliminating the possibility of discharge to surface waters from surface run-off, this alternative provides a moderate level of protection to the environment.

Alternatives 3 through 5, which involve treatment, would be effective in preventing adverse health effects due to ingestion and inhalation of the contaminants in the soil. The potential for on-site exposure to contaminated soil and off-site exposure through migration of possible leachate would be diminished during remediation. Alternative 3 presents a potential for local exposure through inhalation of dusts, and distant exposure from truck releases and accidents during transportation. Substantial impacts would not be expected if appropriate management practices are implemented. Implementation of alternatives 4 and 5 has the potential for exposure due to inhalation of dusts. However, this can be effectively controlled by standard dust suppression techniques.

In addition to eliminating potential exposure to soils, alternatives 3 through 5 provide an adequate level of current and future protection to the environment by limiting contaminant migration off-site. Alternative 3, excavation and disposal, would reduce the potential for future off-site migration of leachate through surface and subsurface routes from onsite sources; however, potential exposure at the offsite disposal area would exist.

Alternative 4 (chemical fixation) would isolate the waste and minimize future leaching into the environment. Alternative 5 (heap leaching) would minimize the potential for off-site migration of leachate through surface and subsurface routes.

7.1.2 Wetland Alternatives

Because the no action alternative offers no reduction in risk to human health and the environment, it is not considered further in this analysis.

The mechanical control alternative for the west marsh would not provide complete protection to a human exposure route via soil ingestion, dermal contact or beef cattle grazing in wetland; however, reduction would occur immediately. Environmental exposure is not protected, since the fence is not an adequate barrier to utilization by wildlife. However, the functional value of the wetland is maintained with this alternative. Mechanical control of east marsh through inundation provides a reducing environment which limits the bioavailability of lead to the plant and animal community, decreasing the potential for environmental exposure. However, the extended period of wetland inundation would promote increased burial of the vegetation and increased peat accumulation. It is believed that gradual protection of human health and the environment will occur through the natural treatment process within the ecosystem. A reduction in mobility of contaminants through flooding controls provides some protection to human health and the environment, by sequestering the lead in the sediments. The potential for human exposure to lead due to swimming in ditches and ingesting water and sediments exists; however, this potential is minimal due to the limited access to the the east marsh. This alternative also decreases the potential to introduce new environmental risks associated with any disturbance of sediments and release of lead to the environment. Excavation of sediments prior to flooding the east marsh would potentially release lead to the environment.

The capping alternative reduces direct contact risk and soil ingestion risk; however, continued migration of contaminated groundwater exists. Capping is considered protective of human health and the environment through reduction in mobility of contaminants. Off-site exposure to site-related contaminants would diminish with isolation of the source by reducing the mobility of contaminants and the potential of future exposure to leachate. By minimizing water infiltration through contaminated soils and eliminating the possibility of marsh water discharge to surface waters through surface run-off, capping provides a moderate level of protection to the environment. Dermal contact during remediation should be prevented by appropriate safety measures.

The sediment removal and solidification alternative would provide protection of human health and the environment by reducing or controlling risk through treatment. The cleanup goal established would effect the degree of protection to human and environmental risk. However, such construction within the wetland would damage the wetland and restoration of its functional value is not guaranteed.

7.2 Compliance with ARARS

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other environmental statutes and/or provide grounds for invoking a waiver.

The primary ARARs for the groundwater are the Florida Water Quality Standards for groundwater, EPA Maximum Contaminant Levels (MCL) and the proposed MCL goal (pMCLG), and EPA Ambient Water Quality Criteria (AWQC) for protection of human health (Table 7).

Also considered as ARARs for groundwater are the RCRA Subpart F groundwater protection standards. These use background MCLs or Alternate Concentration Limits (ACLs) as the cleanup level. The criteria for choosing between background MCLs and ACLs are detailed in the 40 CFR Part 264.94. Florida Water Quality Standards for groundwater, MCLs, and proposed MCLG are also ARARs for the surficial aquifer at this site.

Primary surface water ARARs (Table 8) for this site are the AWQC to protect aquatic life from chronic toxicity and human consumption of toxic fish and shellfish and the Florida Class II Surface Water Standards. The primary surface water ARAR for this site was calculated using the site's water hardness and the AWQC.

Additional ARARs, which are related to discharge options, would need to be met if either of the alternatives for groundwater treatment were chosen. These ARARs include the Clean Water Act, which covers discharges to surface water bodies, and POTW

Table 7

APPLICABLE AND RELEVANT AND APPROPRIATE REQUIREMENTS
SCHUYLKILL METALS CORPORATION, PLANT CITY, FLORIDA

GROUNDWATER
(mg/L)

Indicator Chemical	Florida Water Quality Standards	EPA MCL	EPA Proposed Action Level*	EPA WQC for Protection of Human Health: Threshold Toxicity Protection (ingestion of drinking water only)
Lead	.05	.05	.015	-
Chromium $(^{+}3)$	-	-	-	179
$(^{+}6)$	.05	-	-	.05
(total)	-	.05	-	-
Antimony	-	-		.146
Sodium	160	-	-	-

MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
WQC : Water Quality Criteria
* EPA Office of Drinking Water and Headquarters Guidance

Table 8

APPLICABLE AND RELEVANT AND APPROPRIATE REQUIREMENTS
SCHUYLKILL METALS CORPORATION, PLANT CITY, FLORIDA

SURFACE WATER

	Florida Water Quality Standards for Class III Surface Water	EPA WQC for Protection of Aquatic Life for Freshwater Chronic Criteria (adjusted for water hardness)	EPA WQC For Protection of Human Health (ingestion of aquatic organisms only)
Lead	.03	.013	-
Antimony	-	-	45

AIR

	Lead Concentration
National Ambient Air Quality Standard (NAAQS)	1.5 ug/m^3
Federal Occupational Safety and Health Administration Act (OSHA)	50 ug/m^3

MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
WQC: Water Quality Criteria
POTW: Publicly Owned Treatment Works

pretreatment requirements, which cover contaminant levels being discharged to a POTW. The relevant ARARs will be met by the discharge option chosen.

The appropriate ARARs for lead are based on the more stringent protection levels. For groundwater and surface water these are the proposed MCL and the AWQC for the protection of aquatic life from chronic toxicity effects, respectively.

The Clean Air Act (CAA) identifies and regulates pollutants that could be released during the remedial activities. The CAA Section 109 outlines the criteria pollutants for which National Ambient Air Quality Standards (NAAQS) have been established. CAA Section 112 identifies pollutants for which there are no applicable NAAQS. These substances are regulated under the Federal National Emission Standards for Hazardous Pollutants. As an ARAR these standards will be complied with during any excavation activity.

The Federal Occupational Safety and Health Administration Act (OSHA) will be complied with when any applicable activity is necessary. NAAQS and OSHA ARARs for lead in air are listed in Table 8.

EPA has determined that RCRA requirements for closure of the surface impoundment are relevant and appropriate for this site. Alternatives 2 through 6 will incorporate RCRA closure of the surface impoundment in the remedial design.

The primary ARARs for the soil are the RCRA Subtitle C closure requirements, state requirements, and the treatability variance for soil and debris proposed by 40 CFR 268 Land Disposal Restrictions (LDRs). The criteria for choosing between these standards is specific for each site. Cleanup standards for soils consider the potential for leachate formation under environmental conditions which might cause the concentration of dissolved contaminants in groundwater to exceed 0.015 mg/L, the Proposed Action Level from the Office of Drinking Water and EPA Headquarters Guidance (June, 1990). These target soil concentrations are listed in Table 9.

The RCRA LDRs promulgated in the 1984 Hazardous and Solid Waste Amendments (HSWA) require that RCRA hazardous wastes be treated to BDAT (Best Demonstrated Available Technologies) Standards prior to placement into the land. EPA has promulgated treatment standards for hazardous wastes in a phased approach and promulgated the Toxicity Characteristic (TC) Rule on March 29, 1990. The on-site wastes exhibit EP Toxicity as defined in 40 CFR 261; however, they will now have to be tested using the TC Leaching Procedure (TCLP) to determine if they would be characterized as a hazardous waste.

Excavation and treatment in a separate unit is considered to be placement under RCRA LDR. Therefore, LDR will be an applicable or relevant and appropriate requirement. However, the treatment process will immobilize the metals to the extent that the waste will no longer be hazardous waste as defined by RCRA.

Table 9

CLEANUP GOALS
SCHUYLKILL METALS CORPORATION, PLANT CITY, FLORIDA

SOIL

	EP Toxicity * Regulatory Level mg/L	Toxic Characteristic Regulatory Level mg/L	Target Concentration mg/kg
Lead	5	5.0	500
Cadmium	1.0	1.0	-

* : Definition of hazardous waste (40 CFR Part 261.24(b))

The following are the RCRA ARARs which may apply to this site under 40 C.F.R. Part 264:

Subpart F Groundwater Protection;
" G Closure and Post-Closure;
" I Containers;
" J Tanks;
" K Surface Impoundments;
" L Waste Piles;
" M Land Treatment;
" N Landfills; and,
" X Miscellaneous Units.

7.2.1 Soil, Pond, Ditch, and Groundwater Alternatives

Alternatives 2 and 3 meet the ARARs by containing or removing the contaminated soil which has been found to exceed the ARARs. Containment, Alternative 2, would comply with LDRs when the soils meet testing goals such as the TCLP. Alternative 3 would need to comply with CERCLA §121 (d)(3) and 40 CFR 268 (Subpart D) regarding off-site disposal of hazardous waste thereby achieving the cleanup levels. Alternatives 4 and 5 would treat the soil on-site, and are designed to satisfy ARARs.

Alternatives 2, 3, 4, and 5 meet the federal ARARs and State environmental laws. Groundwater treatment and monitoring will assure compliance with all cleanup goals.

7.2.2 Wetland Alternatives

The Alternatives as they are described in the Wetland FS Addendum may not meet the the ARARs; however, a composite of alternatives or a remedy chosen from various components of alternatives may be more likely to meet ARARs. Mechanical controls requires a waiver of the Federal AWQC. The capping alternative meets all ARARs. The sediment removal alternative may require a waiver of the Federal AWQC due to the potential negative environmental impact that could be created by trying to remediate the marsh to a selected cleanup goal.

7.3 Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

7.3.1 Soils, Pond, Ditch, and Groundwater

Soil remediation for alternatives 2 and 3 would be rather quick to implement and would provide immediate protection from direct contact with soils. Implementation of soil remediation for alternative 4 would take somewhat longer, The method of soil treatment for alternative 5 would probably take the longest time of any alternative, perhaps two years or more. However, both alternatives 4 and 5 would provide immediate protection upon completion.

For all alternatives, surface water and groundwater remediation would take an extended length of time to achieve cleanup goals, perhaps five years or longer. Construction of the collection/treatment system; however, could be completed in a short period of time.

The debris treatment and disposal methods are quick to implement and pose small risk to the community. Incinerating the debris may cause an incomplete combustion and off-gas release. However, controls and monitoring would be implemented.

All alternatives carry some risk of worker exposure to contaminated soils, water and airborne particles during construction. However, these problems can be minimized by personal protection and air monitoring. Truck spillage during transport of contaminated material on-site or off-site may occur if Alternative 3, 4, or 5 is implemented. Alternative 5 may also release some air pollutants or storm water runoff problems from the leaching/smelting process. Measures such as air pollution control systems on the smelter process and runoff control would minimize any environmental impacts.

7.3.2 Wetlands

The mechanical controls alternative for the west marsh would immediately interrupt the soil ingestion and dermal contact exposure pathway, as well as preventing grazing by cattle. The latter would interrupt the human exposure pathway through consumption of contaminated meat. The mechanical controls alternative for the east marsh would allow sediments to remain in place; however, the pathway would be greatly reduced. Monitoring would determine whether natural processes of vegetation uptake and burial achieve a level of protectiveness over the long-term. The capping and sediment removal alternatives provide immediate protection from exposure, depending on amount of sediment removed. Minimal risk is associated with remedy construction for each alternative; however, solidification would require additional precautionary measures to ensure the safety of workers.

7.4 Long-Term Effectiveness

Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

7.4.1 Soil, Pond, Ditch, and Groundwater

Containment of the soils in Alternative 2 cannot be considered a permanent solution. There exists the potential for the cap to fail. This alternative is moderately effective at eliminating the possible exposure pathways and transport mechanisms.

Off-site removals of the soils to a landfill as in Alternative 3 is a long-term solution for this site; however, this does not address the waste itself in a permanent manner. The long-term effectiveness of soil fixation as in Alternative 4 will be demonstrated by the treatability study. The effectiveness will be more than adequate as the process is designed to decrease the possibility of the contaminants leaching over time by immobilizing the contaminants in a permanent manner. The treatment and monitoring of groundwater will indicate any deficiency in the effectiveness of the remedy. Heap leaching soils, as required by Alternative 5, could be very effective as a long-term solution, as it removes contaminants from the soils and recovers them for future use.

The proposed methods for treatment of the debris separated from the soils uniformly eliminate the contaminant source and are effective in the long-term for the site.

Assuming the source of groundwater contamination is removed, all of the treatment methods for surface water and groundwater would provide long-term protection.

7.4.2 Wetlands

Sediment removal and solidification provides the greatest degree of long-term elimination of risk posed by contaminants at the SMC site because the contaminants are permanently bound. The low permeability cover alternative would also provide long-term protection to public health and the environment; however, there is a very slight chance that flood events might occur which could compromise the integrity of the cap. The cap's effectiveness would be evaluated through long-term monitoring.

The long-term effectiveness of the flooding alternative would be evaluated through extensive long-term chemical, physical and biological monitoring. This alternative is expected to gradually diminish the risk posed by contaminants through natural vegetation uptake and a self-cleaning ecosystem. Long-term effects of wind disturbance to sediments are estimated to be minimal at this site. The fence is a permanent structure with routine maintenance required. Institutional controls will be implemented, such as conservation easements, in the wetlands to insure that the area remains undisturbed.

7.5 Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume is the anticipated goal of the remedy's various treatment technologies.

7.5.1 Soil, Pond, Ditch, and Groundwater

Alternatives 4 and 5 would reduce the mobility, toxicity, and volume of the groundwater contamination by decreasing the size of the plume and eliminating the source. Alternative 3 only relocates the source. Alternative 2 does not incorporate any treatment and does not meet the goal of treatment. The volume of treated soil in Alternatives 4 and 5 is such that it can be replaced into the excavated pit; however, stabilization will increase the volume by approximately 37 percent. Mobility is reduced in Alternative 4 through the binding of hazardous constituents into a solid mass with low permeability that resists leaching. Alternative 5 can be used to remove the most soluble portion of the lead, thus removing the most important negative environmental impact associated with this site's type of soil contamination, which is toxic metal mobility.

7.5.2 Wetlands

The sediment removal and solidification would provide a significant reduction of potential toxicity through treatment of the contaminated sediments. There would be a potential for an increase in the volume of waste associated with solidification. The capping alternative provides for a reduction of toxicity and mobility of the contaminants since the sediment would be solidified; however, volume reduction would also not occur with this alternative. These actions would destroy the existing marsh systems and its functions identified in the wetland study.

With the cleanup of the SMC processing area, the magnitude of metal contamination in either the east or west marsh would be limited to existing levels, with the exception of the urban runoff input. The potential toxicity of the contaminated wetland sediments is realized mainly when the sediments are found in an aerobic environment. During the dry season and under drought conditions, the wetlands dry out and the normally reduced surficial sediments become oxidized by oxygen which promotes chemical mobility of the metals contained in the sediments. With increased mobility, the potential for toxic effects is increased.

By implementing the flooding alternative for the east marsh, the period of wetland inundation and the associated reduced condition of its sediments would be extended, thus further minimizing the potential toxic effects of the contaminated sediments. Under an extended period of inundation, the sediments would remain in a reduced state which would promote the production of sulfide and benefit the sequestering effects associated with the formation of metallic sulfide. The extended period of wetland inundation would also promote increased burial of the contaminated sediments. The natural accumulation of organic debris in the wetlands would be enhanced during the extended flooded conditions, because the surface inundation would minimize the contact of the organic peat with the atmosphere. This would promote peat accumulation rather than loss via oxidation effects.

The highest concentration of lead in sediments are associated with the dredge canal located in the east marsh. Because of its greater depth, the existing contaminated sediments will be subject to the continued effects of natural burial. Both organic and inorganic material such as detritus, silt, and clay particles will naturally accumulate as bottom sediment in the deeper canal. Since the SMC will cease to be a source of metal contamination, newly sedimented material would reflect normal chemical characteristics of the area.

Extended flooding and the resulting natural treatment process of the east marsh will reduce the potential toxicity of the contaminated wetland sediment and maintain the beneficial functions of the wetlands. This alternative, however, would not reduce the volume of contaminated material, but instead it would promote isolation of the contaminated material.

The fencing of the west marsh does not address the concern of available sediment toxicity; however, burial by seasonal vegetation will tend to provide a reduction in the sediment metal availability in the same manner as above at a slower rate.

7.6 Implementability

Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7.6.1 Soil, Pond, Ditch, and Groundwater

All of the alternatives are technically and administratively feasible. They all involve technologies which have been used in the past and have a demonstrated performance record. The services and material required for each alternative are expected to be readily available. Each would require obtaining any necessary permits if a surface water discharge is used. Approval and a discharge point would be necessary if the POTW discharge is chosen for these Alternatives.

In Alternative 2, capping and construction of slurry walls requires the demolition of the building. Alternatives 3, 4, and 5 all require dewatering during excavation of the soils due to the high water table and a limited area for equipment mobilization.

Alternative 4 is dependent upon bench scale treatment testing. Alternative 5 will require construction of a treatment pad in a limited available space.

7.6.2 Wetlands

All of the alternatives are technically and administratively feasible. They all involve technologies which are straightforward and easily implemented. The materials required for each alternative are easily obtainable. The east marsh flooding alternative is dependent upon development of a hydrologic model. The cover alternative requires stabilization of sediments to ensure adequate cap support. Solidification requires treatability testing.

7.7 Cost

Cost includes estimated capital and operation and maintenance costs, and are net present worth costs.

7.7.1 Soil, Pond, Ditch, and Groundwater

Each alternative described will have a range in cost depending on the groundwater treatment associated with the specific source remedy where the lowest cost and the highest cost is associated with ion media filtration and microfiltration of the groundwater, respectively. All costs described are the total present worth value.

Alternative 2 with a RCRA-type cap has a total present worth cost of $3,143,000 to $5,442,000. Alternative 3, requiring landfill disposal, has a total present worth cost from $16,425,000 to $183,999,000. Costs for Alternatives 4 and 5 will depend on treatment of the screened battery debris from the processing area soils. Alternative 4, where the debris is disposed off-site, is from $8,469,000 to $10,766,000. Alternative 4, where debris is incinerated on-site, is from $6,768,000 to $9,064,000. Alternative 4, where debris is recycled, is from $5,864,000 to $8,161,000. Alternative 5, involving off-site lead recovery where the debris is disposed off-site, would range from $9,334,000 to $11,230,000. Alternative 5, where the debris is incinerated on-site, would range from $7,633,000 to $9,064,000. Alternative 5 where the debris is recycled, would range from $6,729,000 to $8,625,000. Recycling is the most cost effective method for dealing with the soil-screened debris from either Alternative 4 or 5.

Total present worth cost calculated for capping the source is the most economical; however, the waste is not treated, only contained in this remedy. Landfill disposal is not felt to offer significant increases in protection to public health and the environment, short-term or long-term effectiveness for the extra cost. Chemical fixation is slightly less costly than heap leaching. A summary of these costs is provided in Table 10.

7.7.2 Wetlands

Sediment removal and solidification is estimated to be the most expensive remediation alternative at a range of $2,186,000 to $11,076,000 for both marshes at the SMC site. This range is reflective of the amount of sediment removed, the disposal option for the solidified sediments and the mitigation option for damages to the wetland. The cost for the capping alternative is $4,233,000 for both marshes; however, this includes solidification. The cost for the mechanical control alternative is substantially less than either of these alternatives. The cost of fencing the west marsh and flooding the east marsh is estimated to be a total of $888,000. The cost of also fencing the east marsh is estimated to be $28,000.

8.0 STATE AND COMMUNITY ACCEPTANCE

The State of Florida, as represented by the Department of Environmental Regulation (DER), has had the lead for the SMC site during the RI/FS, and therefore has been actively involved. Both agencies (DER and EPA) concur in the selection which will address the source of contamination, surface water,

Table 10

Total Present Worth Costs for Remedial Action Alternatives

Alternative	Description	Total Present Worth Cost
1	No Action	$557,000
2	RCRA Cap	$ 3,143,000 - $ 5,442,000
3	Landfill Disposal	$16,425,000 - $ 18,400,000
4	Solidification	
	a. debris: off-site disposal	$ 8,469,000 - $ 10,766,000
	b. debris: on-site incineration	$ 6,768,000 - $ 9,064,000
	c. debris: recycled	$ 5,864,000 - $ 8,161,000
5	Heap Leaching	
	a. debris: off-site disposal	$ 9,334,000 - $ 11,230,000
	b. debris: on-site incineration	$ 7,633,000 - $ 9,064,000
	c. debris: recycled	$ 6,729,000 - $ 8,625,000

groundwater, and the marshes. Limited comments were received from the community regarding the RI/FS study. Based on comments made by citizens at the public meeting held on August 30, 1990, and those received during the public comment period, the community believes the chemical fixation, surface water and groundwater treatment, and the wetland mechanical controls will effectively protect human health and the environment.

9.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, available data collected to date, the detailed analysis of alternatives, and public comments, both EPA and the State have determined that Alternative 4, or more specifically, Alternative 15c of the FS for the soil, ditch, pond, and groundwater and the mechanical control alternative for the wetlands are the most appropriate remedies for the Schuylkill Metals site. These alternatives involve:

- Excavation of contaminated soil and debris
- Separating soils from debris by screening
- Excavation of contaminated ditch sediment
- Chemical fixation of soil and sediment
- Grinding and washing of debris
- Debris recycling
- Groundwater collection trenches
- Pond-pumping groundwater collection
- Groundwater chemical treatment and filtration
- Discharge of treated water to POTW or site waters
- East marsh flood control mechanisms
- East and west marsh fencing
- East and west marsh physical, chemical, and biological monitoring
- Mitigation
- Operation and Maintenance

The EPA and the State have also included in the list above additional requirements to the alternatives described in the Feasibility Studies to ensure the remedy is effective, such as mitigation and east marsh fencing. Battery casings, chips, and debris mixed with soil will be excavated, screened, washed and marked for recycling or chemical fixation. It is estimated that removal of the casings and debris would require a maximum excavation of 54,500 cubic yards (cy), as indicated by the casings and debris generally being confined to lenses within the soil. The maximum volume of battery casings which may be recycled at an EPA approved facility is calculated to be 18,500 cy. The remaining 36,000 cy of contaminated soil will be excavated and treated. Excavation for battery casings and debris will be performed on 50 foot by 50 foot cells with an estimated depth of 3 to 10 feet below land surface. Dewatering techniques during excavation will depend on site conditions and will include direct pumping, well points, or drainage trenches. This collected water in addition to wash water from the separation process will be pumped to the groundwater treatment system.

Confirmatory sampling of each cell will determine the extent of excavation. Cells with soil concentrations exceeding the cleanup goal of 500 mg/kg lead will continue to be excavated.

The perimeter ditch will be excavated to a depth of two feet, where the lead above 500 mg/kg is believed to be located. Confirmatory sampling will determine the extent of excavation. This is easily implemented and meets the protectiveness level for potential leaching to groundwater. During the remedial design the appropriate ditch reconstruction will be determined, considering the effects of other site remedial activities, especially the wetlands.

All sediment in the ditches to a depth of 2 feet and soil above 500 mg/kg lead will be treated using chemical stabilization to bind the hazardous contaminants into a solid mass that resists leaching. Treatability tests performed on site soil has determined the most desirable mix to maintain long-term solidification and stabilization. The resulting solid monolith will be replaced in the excavation area.

Groundwater will be pumped from the pond and the dewatering areas to a surge tank to equalize flow rate prior to treatment. It is estimated that the average daily flow to the treatment system is 259,200 gallons per day. The water from the surge tank will be pumped to a barge anchored in the pond and screened for large debris removal. Chemicals, caustic and filter-aid will be added to the inlet tank on the barge to precipitate the lead. The chemical slurry mix will be dewatered and solids will be treated with the site soil. Treated water will be discharged to the local POTW or reintroduced to the wetlands onsite. This will be determined during remedial design. Treated water will be monitored for flow, pH and other required permit parameters prior to discharge to the city sewer.

The purpose of this response action is to control risks posed by direct contact with contaminated soils, groundwater and surface water and to minimize migration of heavy metals to groundwater and surface water. Additionally, this action will provide a measure of protection to aquatic and terrestrial organisms living in and around the wetlands while still preserving the integrity of the wetlands by eliminating the source of contamination in the processing area.

The primary contaminant at the site, lead, has been shown to produce chronic and subchronic adverse health effects. Calculations performed using likely routes of exposure to contaminants at the site have determined that acceptable daily intakes of lead may be exceeded by persons frequenting the site if no remedial action is taken.

Since no Federal or State ARARs exist for soil, the cleanup goal for the lead in soil was determined through site-specific analysis. This analysis involved the calculation of the possible daily intake of soils associated with the site by persons of the most sensitive age group. Using a previously established acceptable daily intake of lead for this age group, it was determined that a lead concentration of 538 mg/kg in soils would be protective of health through the direct contact pathways. Based on site investigations (WWC, 1989), it was determined that a cleanup goal of 505 mg/kg should prevent excessive leaching of lead from soils that would result in groundwater lead concentrations above 0.05 mg/L. Based upon these analyses, the EPA determined that 500 mg/kg lead is an appropriate cleanup level for this target ground water level. The amount of lead in the leachate must not exceed the recently proposed revision to the MCL of 0.015 mg/L.

Contaminated groundwater and pond surface water at the site will be collected and treated to achieve the ARARs. The most recent EPA guidance indicates a cleanup level of 0.015 mg/L for lead in groundwater for potable water is protective of human health. Groundwater exceeding a lead concentration of 0.015 mg/L, or the background concentration, whichever concentration is highest, will be collected and treated to that concentration. During the Remedial Design, EPA will select a procedure for statistically determining the background concentration of the contaminants. The groundwater treatment system will treat the water to meet standards based on the methods of disposal. Treated water to be discharged to the POTW will meet all requirements set by the POTW. Any treated water discharged to the wetlands will be treated to comply with the AWQC for lead at this site of 0.013 mg/L. This will be addressed further during remedial design.

Should lead concentrations decline with treatment and approach asymptotic concentrations following prolonged recovery and treatment, the Agency may seek an ARAR waiver and a ROD amendment issued. However, any permitting requirements must still be met for surface water discharge.

The treatment method chosen for site soils will eliminate the threat to health through direct contact by binding the contaminated media in a solid mass. Treatability studies demonstrate that leaching of the mass by groundwater will not result in groundwater contamination above the cleanup goals. A groundwater monitoring program will assure the satisfactory performance of this treatment method.

Though contaminants other than lead exist at the site, the concentrations of these contaminants are such that once each medium is remediated to the lead cleanup levels, these other contaminants will be reduced to concentrations that will not pose a health threat.

The characteristics of Alternative 4 for the soil, pond, ditches, and groundwater that are considered most important are that it:

- Provides immediate protection to human health from direct contact with contaminated soils upon completion of construction.

- Provides immediate protection to human health from the potential threats associated with consumption of groundwater from the site.

- Limits migration of contaminated groundwater off-site and controls migration of contaminants into the aquitard and lower aquifers.

- Provides a measure of protection to wildlife living in and around the east marsh while still protecting the wetlands from further damage.

- Provides for management of surface water quality through monitoring of contaminant levels in the surficial aquifer and possible surface water discharges.

- Contributes to the implementation of a more permanent remedy at the site.

The recommended alternative requires a certain degree of annual Operation and Maintenance (O&M) activity to ensure that groundwater will be treated to meet the cleanup levels. The degree of O&M cannot be determined until the discharge option is selected. An O&M plan will need to be developed during the remedial design/remedial action phase. All O&M responsibilities will be covered as specified in Section 104(c) of SARA.

Wetland contamination will also be addressed in the selected remedy. The west marsh is partially protected by the existing site fence. This has been supplemented by the modification of the existing fence on the western boundary of the marsh. The fence effectively keeps humans and cattle from entering the marsh.

A fixed weir will be constructed at the outlet of the east marsh to maintain perennial surface water inundation in this marsh. The height of the weir will be determined during remedial design and will be enhanced using a supporting berm near the outlet. Approximately one acre of wetland in the east marsh will be impacted from construction activities.

The perimeter ditch may be relocated after sediment excavation, in order to direct surface water flow into the east marsh, further ensuring that it remain inundated. This will be incorporated into the remedial design.

Monitoring of both wetlands will include chemical and biological sampling in sediment and surface water. This will be performed biannually during the wet and dry season. Vegetation monitoring of habitat structure will determine impacts from lead concentrations and reclamation of the SMC site, metal accumulation levels over time, and protectiveness of the remedy. Invertebrate monitoring will aid in assessing the remedy's effectiveness. Monitoring will include vertical sediment sampling of metal concentrations. Institutional controls, such as conservation easements, will be implemented. A public health assessment will be conducted by EPA five years after remedial action implementation. Following this assessment, monitoring activities will be evaluated on the basis of the need for further remedial action or monitoring.

The Wetland Impact Study concluded that removal of the hazardous waste from the site would no doubt result in a diminished source of heavy metals to the east and west marsh. It is assumed that the marshes receive the lead contamination from the site soil source. Once this source is remediated, sediments and surface waters of the marsh would then be flushed with groundwater having safe levels for the marsh. This will be accomplished through the reintroduction of treated water to the surface waters of the east marsh, in the event the water is not entirely discharged to the POTW. Placement of treated water on the marsh will also aid in maintaining perennial inundation.

The study also concluded that a disruption of the anaerobic chemistry of the sediment would tend to mobilize the metals through oxidation processes. Minimal disturbance of the marsh would be effective in sequestering the metals in sediments. Maintaining the sediments in an anaerobic state by providing continuous surface water inundation will enhance the marshes natural tendency to bind the metals. Mobilization of lead could be caused by the use of heavy earth moving equipment mixing the marsh sediments and forcing the contaminants deeper into the peat sediments. Sediment dredging could suspend lead particulates that are bound to the marsh sediments and release them into the water column, thus allowing lead to potentially migrate off-site. The wetlands serve as a catchment basin, trapping and holding contaminated sediments. The dense wetland vegetation contribute to this ability to retain sediments and associated contaminants.

Lead, iron, and aluminum concentrations in the west marsh surface waters exceeded National Ambient Water Quality Criteria (AWQC) and iron and aluminum concentrations in the east marsh surface water exceeded the Federal AWQC. Therefore, this alternative requires a waiver of the Federal AWQC. The waiver is justified by the negative environmental impact that could be created by trying to remediate the entire area of the wetlands and potential mobilization of lead beyond the site area (CERCLA 121(d)(4)(B)).

Federal Executive Order 11990, Protection of Wetlands, requires federal agencies in carrying out their responsibilities to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Section 404(b)(1) of the Clean Water Act also requires that practicable steps must be taken to minimize adverse impacts to wetlands from fill. In the case of this alternative, the contaminated sediments remaining in the marsh will not allow maximum biological productivity and diversity of the wetland ecosystem. To minimize the effects of this impact, mitigation for the wetlands are required. Creation of a new area of wetlands will compensate for the functions lost or effected in the onsite wetland. The specific mitigation plan will be developed in accordance with the EPA regional mitigation guidelines.

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. Should ARARs be unattainable for discharge to the marsh, or if the POTW will not receive recovered groundwater and surface water, then the appropriate permitting will be obtained for discharge to surface waters. 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 of chemical fixation of the processing area and the ditch sediments is protective of human health and the environment by eliminating the source of contamination and the direct threat through dermal contact with surface soils and ditch sediments. The collection of surface water and ultimately groundwater in the pond and trenches will reduce the risk of consumption of contaminated groundwater. This will be accomplished by pumping water from the pond to induce groundwater flow from the affected surficial aquifer to the pond area.

The routes by which the landfill impacts the wetland is through surface water transport and groundwater flow. Water flows off and through the processing area to the wetlands thus providing a pathway for metal transport into the wetland. Remediation of the site soil will lead to greatly reduced future metal loading to the wetlands. Also, by changing the wetland's hydroperiod to a more permanently flooded marsh system, the sediments become anaerobic. The sulfur bacteria in the sediments reduce sulfate to sulfide, which reacts with most heavy metals to form a metallic sulfide. This process chemically binds and sequesters the metals in the sediments through a natural anaerobic process thus reducing contaminant mobility and risk to the environment.

10.2 Attainment of ARARs

The selected remedy requires a waiver of the Federal AWQC because the wetlands surface water exceeds the AWQC levels for iron, aluminum, and lead. This waiver only applies to the present condition of marsh surface water and not any treated waters discharged to the marshes. The waiver is justified by the potential negative environmental impact that could be created by trying to remediate the wetland sediments (CERCLA 121(d)(4)(B)). It is anticipated that the Federal AWQC will be met in the long-term.

The selected remedies were found to meet or exceed all of the following ARARs:

Resource Conservation and Recovery Act (RCRA):

- 40 C.F.R. Part 265 Subpart G: Closure and Post-Closure
- 40 C.F.R. Part 265.228: Surface Impoundment Closure and Post-Closure Care
- 40 C.F.R. Part 265.90: Groundwater Monitoring
- 40 C.F.R. Part 268 Land Ban: The RCRA land disposal restrictions ("LDR") (40 CFR Part 268) promulgated in the 1984 HSWA amendments require that RCRA hazardous wastes be treated to BDAT (Best Demonstrated Available Technologies) Standards prior to placement into the land. The on-site wastes are characterized as RCRA wastes for lead, arsenic, and cadmium because they exhibit EP Toxicity as defined in 40 CFR Part 261.

Excavation and treatment in a separate unit is considered to be placement under RCRA LDR. Therefore, LDR is an applicable/or relevant and appropriate requirement. However, the treatment process will immobilize the metals to the extent that the waste will no longer be classified as a hazardous waste as defined by RCRA.

Clean Water Act/Safe Drinking Water Act:

EPA's determination of appropriate groundwater cleanup criteria involved an evaluation of contaminant concentrations relative to available health-based standards. Such limits include the following:

- Maximum Concentration Levels (MCLs) and Maximum Concentration Limit Goals (MCLGs), as defined in the Safe Drinking Water Act (SDWA) (40 CFR Part 141 and 142).

- Ambient Water Quality Criteria (AWQC) Section 204 of the Clean Water Act (CWA) used as prescribed in Section 121(d)(2)(B)(i) of CERCLA for consumption of drinking water only, or for consumption of aquatic organisms and drinking water.

Other:

- National Ambient Air Quality Standards (NAAQS)

- Florida Groundwater Standards

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

- POTW Standards (40 CFR 403.5 and local regulations)

10.3 Cost Effectiveness

EPA and the Florida DER believe the selected remedy is cost effective with an estimated total worth value of $6,229,500. This cost includes the capital cost of $4,179,000 and O & M of $1,685,000 for the source, surface, and groundwater treatment and the capital cost of $188,000 and O & M of $137,500 for the wetland remediation. Mitigation and cost of fencing the east marsh will be determined during remedial design. This remedy is effective in mitigating the risk posed by the soils in a reasonable amount of time. Stabilization is a proven technology which will address the principal threat posed by the lead-contaminated soil. This treatment will halt migration of the contaminants into the lower drinking water aquifer and the wetlands on-site. The costs of the selected remedy are proportionate to the overall effectiveness it affords, such that it represents a reasonable value for the money.

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

US EPA and the Florida DER have 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 soil, pond water and groundwater remedy provides effective protection in the short- and long-term to potential human and environmental receptors, protects the aquifer from contamination, is readily implementable, is cost effective and is consistent with future response actions that may be undertaken at the site.

By eliminating the source of contamination, the effects on the wetlands will be significantly diminished in the long-term. By flooding the wetland the toxicity and mobility of the contaminants will be significantly reduced both in the short-term and the long-term. The criteria were evaluated for the wetlands with the consideration of the importance of the functional value of wetlands, especially in Florida. This remedy for the wetlands represents the best trade-off to maintain existing wetlands while creating or restoring additional wetland areas. No net loss of wetlands at the site will be achieved.

The selected remedy for the wetlands is more easily implemented and significantly less costly than the other alternatives. It also offers some short-and long-term protection to human health and long-term protection to the environment.

10.5 Preference for Treatment as a Principal Element

The statutory preference for treatment will be met for the soil, pond, and groundwater. The principal threat from the Schuylkill Metals Corporation site is ingestion of contaminated groundwater and ingestion or dermal absorption of metal contaminated soils. The selected remedy will reduce this risk through treatment of the soils, surface water and groundwater. By stabilizing the metals-contaminated soils, the selected remedy addresses a principal threat posed by the site through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Treatment is impracticable and was not the preference for the wetlands, since it is not appropriate for these sensitive, diminishing, wildlife habitat areas. Excavation and treatment of the sediments would have greatly impaired the marsh's thriving existing ecological ecosystem. It has been documented to be a highly functional wetland, serving as a local catchment basin for urban run-off.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan was released for public comment in August, 1990. During the public comment period, the State of Florida suggested that the east marsh be fenced to prevent access and/or direct contact. The Proposed Plan addressed fencing the west marsh in the preferred alternative; however, the ROD addresses fencing the east marsh as well. EPA agrees with the State in instituting this additional measure of protection. Otherwise the Proposed Plan identified the ROD's selected remedy as the preferred remedy. The capital cost estimated for a 6 foot cyclone fence is $22,000. This fence would extend along the south, east and northern boundary of the east marsh connecting to the existing site fence on the western side. O&M cost is estimated to be $6,000. Total present worth cost would therefore be $28,000. Implementation time is approximately 1 - 2 months. The decision to fence this impacted wetland is considered a logical outgrowth of the information in the Proposed Plan.

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APPENDIX I

WETLAND SAMPLING DATA

TABLE 3
SURFACE WATER DATA SUMMARY
SCHUYLKILL METALS
PLANT CITY, FLORIDA
May, 1989

INORGANIC ELEMENTS	SM-1W UG/L	SM-2W UG/L	SM-3W UG/L	SM-4W UG/L	SM-5W UG/L	SM-7W UG/L	SM-8W UG/L	SM-8WD UG/L	SM-9W UG/L	SM-11W UG/L	SM-PB UG/L
ARSENIC	--	--	--	--	--	--	54	20	21	--	--
BARIUM	15	14	14	14	15	14	84	71	40	14	--
CADMIUM	--	--	--	--	--	--	7.1	5.7	--	--	--
CHROMIUM	--	--	--	--	--	--	12	--	--	--	--
COPPER	--	--	--	--	--	--	36	30	11	--	--
LEAD	--	--	--	--	--	--	440	330	46	--	--
ANTIMONY	--	--	--	--	--	--	28	31	--	--	--
STRONTIUM	580	590	590	610	620	600	560	540	690	610	--
TITANIUM	--	--	--	--	--	--	30	27	15	--	--
ZINC	--	15	13	16	10	--	540	430	120	11	--
ALUMINUM	570	550	540	680	870	620	8200	6600	2200	570	--
MANGANESE	160	160	160	160	160	160	250	220	200	160	--
	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
CALCIUM	100	100	100	100	100	100	120	120	140	100	--
MAGNESIUM	12	12	12	13	13	13	14	14	18	13	--
IRON	0.74	0.63	0.68	0.77	0.86	0.66	27	22	6.0	0.67	--
SODIUM	270	270	270	290	290	280	190	200	270	280	--
POTASSIUM	18	18	19	18	19	19	5.0	3.6	18	19	--
GENERAL INORGANIC PARAMETERS	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
SULFIDES	0.67	NA	0.29	NA	0.54	NA	27	38	110	0.29	--
PHYSICAL PARAMETERS	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
HARDNESS(AS CACO3)	300	320	310	340	330	310	390	360	440	340	--

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FOOTNOTES

NA - NOT ANALYZED
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

Table 6. Water Chemistry Results September, 1989
Sample Site

Sample Site and Data

Parameter	SM-3 9/26/89 unfiltered	SM-7 9/26/89 unfiltered	SM-8 9/26/89 unfiltered	SM-9 9/26/89 unfiltered	SM-12 9/26/89 unfiltered	SM-13 9/26/89 unfiltered	SM-14 9/26/89 unfiltered	SM-15 9/26/89 unfiltered	SM-16 9/26/89 unfiltered	SM-9a 10/9/89 unfiltered	SM-9a 10/9/89 filtered	SM-9b 10/9/89 unfiltered	SM-9b 10/9/89 filtered	Sample Blank 10/9/89 unfiltered	Sample Blank 10/9/89 filtered
Aluminum (ug/L)	460	440	200	130U	130U	130U	750	1500	4700	210	130	140U	140	100U	150
Antimony (ug/L)	35U	35U	35U	35U	35U	35U	35U	35U	35U	30U	30U	NA	30U	30U	30U
Arsenic (ug/L)	5UJ	6UJ	6U	10U	2UJ	1J	3UJ	3UJ	3UJ	30U	30U	NA	30U	30U	30U
Barium (ug/L)	25U	25U	25U	25U	25U	25U	25U	25U	49	26	18	NA	16	21	47
Beryllium (ug/L)	2U	2U	2U	2U	2U	2U	2U	2U	2U	5U	5U	NA	5U	5.0U	5.0U
Cadmium (ug/L)	3UR	3UR	3UR	3UR	3UR	3UR	3UR	3UR	3UR	5U	5U	NA	5U	5.0U	5.0U
Calcium (ug/L)	61000	59000	22000	41000	21000	28000	4100	23000	28000	42000	41000	40000	41000	500	500
Chromium (ug/L)	5U	5U	5U	5U	8U	5U	11	5U	22	10U	10U	NA	10U	10U	10U
Cobalt (ug/L)	12U	12U	12U	12U	12U	12U	12U	12U	20U	10U	10U	NA	10U	10U	10U
Copper (ug/L)	4U	4U	4U	4U	4U	4U	4U	4U	4U	10U	10U	NA	10U	10U	10U
Iron (ug/L)	3100	3000	1100	950	1400	1400	1600	2800	2500	890	830	990	820	50U	50U
Lead (ug/L)	4J	4J	5J	3UJ	5J	3UJ	110J	200J	570J	40U	40U	NA	40U	40U	40U
Magnesium (ug/L)	9200	9200	4300	5900	4700	6500	3500	2700	2200	5400	5100	5200	5100	10U	20U
Manganese (ug/L)	180	160	90	130	74	110	54	38	40	140	130	120	130	10U	10U
Mercury (ug/L)	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	.20U	.20U	.20U	NA	NA	NA	NA	NA	NA
Nickel (ug/L)	20U	20U	80U	30U	20U	20U	70U	20U	20U	20U	20U	NA	20U	10U	10U
Potassium (ug/L)	15000	13000	10000	120000	4900	6800	2400	23000	18000	9600	11000	12000	11000	20U	20U
Selenium (ug/L)	1UJ	1UJ	1UJ	1UJ	1UJ	1UJ	1UJ	2UJ	1UJ	40U	40U	NA	40U	2000U	2000U
Silver (ug/L)	6U	6U	6U	6U	6U	6U	6U	6U	6U	10U	10U	NA	10U	40U	40U
Sodium (ug/L)	150000	140000	38000	30000	14000	16000	47000	41000	26000	53000	34000	34000	34000	10U	10U
Thallium (ug/L)	1U	2U	2U	1U	1U	1U	1U	1U	1U	100U	100U	NA	100U	2000U	2000U
Tin (ug/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	25U	25U	NA	25U	10U	10U
Vanadium (ug/L)	20U	20U	11U	20U	11U	11U	11U	20U	20U	10U	10U	NA	10U	50U	50U
Zinc (ug/L)	39	19	29	19	20	29	39	29	29	19	84	NA	84	100U	100U
pH (std units)	5.7	5.6	6.3	6.4	5.8	6.3	6.1	6.0	6.0	6.2	NA	NA	NA	25U	25U
Dissolved Oxygen (mg/L)	0.2	0.2	0.1	0.2	0.4	0.5	0.1	1.0	0.1	1.11	NA	NA	NA	10U	10U
Conductivity (umhos/cm)	183	188	439	393	184	244	2050	871	305	389	NA	NA	NA	10U	10U
E_H	-0.202	-0.270	-0.254	-0.151	-0.042	-0.094	-0.303	-0.262	-0.278	-0.098	NA	NA	NA	10U	10U
Dissolved Solids (tot mg/L)	205	210	84	130	68	96	NA	NA	NA	360J	370J	NA	NA	40	60
Hardness (mg/L as $CaCO_3$)	400	370	240	NA	NA	NA	NA	NA	NA	120	NA	120	NA		
Alkalinity (mg/L)										110	NA	110	NA		
Sulfate (mg/L)										13	NA	13	NA		
Sulfides (mg/L)										0.5UJ	NA	0.5UJ	NA		
Chloride (mg/L)										48	NA	47	NA		
Bromide										5.7	NA	5.7	NA		
Nitrate-N (mg/L)										0.04	NA	0.01U	NA		
Nitrite-N (mg/L)										0.01U	NA	0.01U	NA		
Ammonia (mg/L)										0.99	NA	0.91	NA		
Ortho-phosphate -P(mg/L)										0.91	NA	0.92	NA		
Bicarbonate										NA	NA	NA	NA		
Carbonate (mg/L)										2.0U	NA	2.0U	NA		
Silicon (ug/L)										4.0	NA	3.7	NA		
Organic Carbon (dis.mg/L)										48	NA	50	NA		
Organic Carbon (tot. mg/L)										74	NA	54	NA		

FOOTNOTES***
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Filtered: 0.4 Nucleopore[R]

SM-14, SM-15, and SM-16 samples located in west marsh
All other samples located in east marsh

a and b - repli amples on 10/9/89

TABLE 2
SOIL AND SEDIMENT DATA SUMMARY
SCHUYLKILL METALS
PLANT CITY, FLORIDA
May, 1989

INORGANIC ELEMENTS	SM-1S MG/KG	SM-2S MG/KG	SM-3S MG/KG	SM-4S MG/KG	SM-5S MG/KG	SM-6S MG/KG	SM-7S MG/KG	SM-8S MG/KG	SM-8SD MG/KG	SM-9S MG/KG	SM-10S MG/KG	SM-11S MG/KG	SM-12S MG/KG	SM-13S MG/KG
ARSENIC	17	32	42	40	39	9.0	72	37	42	15	28	60	14	35
BARIUM	59	71	72	70	70	150	86	62	60	150	140	190	57	27
BERYLLIUM	--	--	--	--	--	--	--	1.1	--	1.2	--	--	--	--
CADMIUM	3.8	4.2	22	34	19	--	30	3.2	2.9	4.4	--	2.2	0.77	0.90
COBALT	--	2.5	8.5	3.8	3.9	--	--	2.5	2.6	2.0	--	--	1.7	1.5
CHROMIUM	16	25	33	39	30	36	39	23	23	49	39	38	20	7.1
COPPER	20	29	15	33	24	29	92	19	20	37	76	53	15	13
MOLYBDENUM	--	--	--	--	--	--	--	2.0	--	2.0	--	2.0	2.0	2.7
NICKEL	8.7	12	40	36	54	6.2	38	14	15	14	9.5	8.9	7.2	5.4
LEAD	260	330	3500	1200	1500	110	1300	740	820	610	310	530	170	320
ANTIMONY	13	91	59	140	72	--	560	31	39	82	--	83	--	8.2
TIN	--	5.3	--	--	--	--	21	--	--	--	--	13	--	--
STRONTIUM	130	140	180	130	140	420	120	240	220	570	370	270	160	77
TITANIUM	48	92	40	71	73	89	65	48	34	110	83	150	54	13
VANADIUM	18	18	19	33	23	30	26	23	22	43	29	47	16	10
YTTRIUM	10	14	24	14	14	26	21	22	21	31	23	21	9.6	3.1
ZINC	170	65	210	150	180	38	290	48	77	66	100	27	34	61
MERCURY	0.37	0.15	--	0.12	--	0.11	--	--	0.08	0.07	0.12	0.08	--	0.07
ALUMINUM	12000	16000	57000	18000	27000	23000	42000	16000	16000	17000	23000	12000	8600	3000
MANGANESE	38	18	29	26	23	7.9	20	25	26	17	12	28	12	34
CALCIUM	7900	6400	8000	5100	6600	8600	4400	12000	13000	11000	6800	7600	14000	18000
MAGNESIUM	570	630	1100	970	1000	350	630	680	750	680	470	770	990	1300
IRON	10000	8300	41000	5500	6400	1600	31000	5400	5500	2800	1900	11000	3400	5900
SODIUM	2400	3500	5500	30000	43000	840	8400	2700	2700	3000	1200	3300	740	880
TOTAL ORGANIC CARBON	29000	3100	170000	200000	290000	150000	190000	180000	160000	180000	130000	140000	46000	220000

****

FOOTNOTES

NA - NOT ANALYZED
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED

Table 8. Sediment Chemistry Results
September, 1989
Sample Site and Date

Parameter	SM-3 9/26/89	SM-7 9/26/89	SM-8A 9/26/89	SM-8B 9/26/89	SM-8C 9/26/89	SM-8D 9/26/89	SM-9 9/26/89	SM-12 9/26/89	SM-13A 9/26/89	SM-13B 9/26/89	SM-13C 9/26/89	SM-13D 9/26/89	SM-9a 10/9/89	SM-9b 10/9/89
Aluminum (mg/kg)	34000J	66000J	10000J	10000J	6900J	4200J	9200	5700	8100J	18000J	11000	7500J	4800	3900
Antimony (mg/kg)	90U	200U	340U	40U	50U	100U	100U	90U	100U	40U	270U	50U	40U	30U
Arsenic (mg/kg)	30U	84	20U	7U	6U	20U	20U	8U	30U	19	20U	17	7U	8U
Barium (mg/kg)	60U	98U	70U	31	40U	70U	50	60U	70U	43	45U	40U	69	49
Beryllium (mg/kg)	8U	7.8U	5.3U	2.2U	2.5U	4.9U	3.5U	4.7U	5.3U	2.3U	3.6U	2.8U	4.8U	4.3U
Cadmium (mg/kg)	7.1UR	70UJ	7.9UR	3.4UR	3.7UR	7.4UR	5.3UR	7UR	7.9UR	3.4UR	5.4UR	4.1UR	4.8U	5U
Calcium (mg/kg)	5100	6900	7300	8300	7100	7500	6200	7600	14000	7200	8900	4700	11000J	8300J
Chromium (mg/kg)	20U	48	20U	5.6U	6.2U	20U	21	46	31	22	21	33	18	27
Cobalt (mg/kg)	30U	50U	40U	20U	27	30U	30U	30U	40U	20U	30U	20U	12U	20U
Copper (mg/kg)	53	54	37	4.5U	18	9.9U	32	9.3U	19	24	13	5.5U	90UJ	60UJ
Iron (mg/kg)	28000J	83000J	7300J	2800J	2200	1800J	2200J	2200J	4300J	2500J	2400J	2000J	2700J	1900J
Lead (mg/kg)	1500	940	1200	25	16	33	410	120	250	75	50	5U	80	89
Magnesium (mg/kg)	1300	1500	460	540	510	720	390	620	750	440	510	340	1800	1200
Manganese (mg/kg)	42	30	21	9U	20	20U	15	7U	22	18	20U	23	17	13
Mercury (mg/kg)	1.2U	2U	1.3U	0.56U	0.62U	1.2U	0.88U	1.2U	1.3U	0.57U	0.9U	0.69U	0.47U	0.46U
Nickel (mg/kg)	160J	80U	60U	40UJ	40UJ	50UJ	60UJ	50U	70UJ	60UJ	36U	70UJ	30U	30U
Potassium (mg/kg)	1300U	2200U	1500U	610U	670U	1300U	950U	1300U	1500U	610	970U	750U	460U	420U
Selenium (mg/kg)	2.4U	3.9U	2.6U	3U	3U	2.5U	1.8U	2.3U	2.6U	3U	1.8U	1.4U	3UJ	2UJ
Silver (mg/kg)	20U	30U	20U	6.7U	20U	20U	20U	14U	20U	6.8U	20U	8.3U	7.2U	6.4U
Sodium (mg/kg)	8800	24000	3400U	1900	2300U	4500	2300U	3000U	3400U	1500U	2300U	1800U	1200	1000
Thallium (mg/kg)	2.4U	3.9U	2.6U	1.1U	1.2U	2.5U	1.8U	2.3U	2.6U	1.1U	1.8U	1.4U	1.1U	1.1U
Tin (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium (mg/kg)	40U	45	30U	30U	20U	35	40U	30U	30U	30U	40U	20U	20	18
Zinc (mg/kg)	110J	190J	50U	55J	20UJ	40UJ	53J	40UJ	110J	97J	130J	85J	42	34

FOOTNOTES***
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A = sample from 0 to 1 feet
B = sample from 1 to 2 feet
C = sample from 2 to 3 feet
D = sample from 3 to 4 feet

a and b = replicate samples on 10/9/89

SM-14, SM-15, and SM-16 samples located in west marsh
All other samples located in east marsh

Table 8. Continued Sediment Chemistry Results

Sample Site and Date

Parameter	SM-14 9/26/89	SM-15A 9/26/89	SM-15B 9/26/89	SM-15C 9/26/89	SM-15D 9/26/89	SM-16 9/26/89
Aluminum (mg/kg)	500J	5600J	8100J	7700J	3300J	7200J
Antimony (mg/kg)	20U	80U	90U	90U	40U	500U
Arsenic (mg/kg)	3U	8U	6U	2U	2U	8U
Barium (mg/kg)	17	60U	30U	20U	20U	70U
Beryllium (mg/kg)	.84U	4.4U	1.9U	1.4U	1.2U	5.1U
Cadmium (mg/kg)	4UJ	20UJ	5UJ	4UJ	1.9UR	40UJ
Calcium (mg/kg)	3200	8400	7600	5100	1700	13000
Chromium (mg/kg)	4.5	35	15	6U	12	41
Cobalt (mg/kg)	5U	30U	20U	8.7U	7.4U	40U
Copper (mg/kg)	6	24	21	5.2	2.5U	32
Iron (mg/kg)	1800J	4600J	2000J	630J	330J	9800
Lead (mg/kg)	520	950	700	29	22	2800
Magnesium (mg/kg)	130	490	340	220	110U	750
Manganese (mg/kg)	10U	37	18	20U	15	32
Mercury (mg/kg)	.21U	1.1U	.47U	.36U	.31U	1.3U
Nickel (mg/kg)	20UJ	50U	40UJ	40UJ	30UJ	90UJ
Potassium (mg/kg)	230	2200	760	600	330U	1400
Selenium (mg/kg)	.42U	2.2U	2U	3U	.62U	2.6U
Silver (mg/kg)	4U	20U	5.6U	4.3U	3.7U	20U
Sodium (mg/kg)	540U	2900U	2400	2600	2200	3900
Thallium (mg/kg)	.42U	2.2U	.93U	.72U	.62U	2.6U
Tin (mg/kg)	NA	NA	NA	NA	NA	NA
Vanadium (mg/kg)	8U	41	20U	20U	20U	46
Zinc (mg/kg)	17J	90J	78J	70J	19J	64J

FOOTNOTES***
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APPENDIX II

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
SCHUYLKILL METALS CORPORATION SITE
PLANT CITY, FLORIDA

I. Responsiveness Summary Overview

The U. S. Environmental Protection Agency (EPA) held a public comment period from August 17, 1990 through September 14, 1990 for interested parties to comment on the Remedial Investigation/ Feasibility Study (RI/FS) report and the Proposed Plan prepared for the Schuylkill Metals Corporation (SMC) site in Plant City, Hillsborough County, Florida.

The Proposed Plan, which is included as Appendix A of this document, provides a summary of the background information leading up to the public comment period. Specifically, the Proposed Plan includes information pertaining to the history of the SMC site, the scope of the proposed cleanup action, the risks presented by the site, the descriptions of the remedial alternatives evaluated by EPA, the identification of EPA's preferred alternative, the rationale for EPA's preferred alternative, and the community's role in the remedy selection process.

EPA held a public meeting at 7:00 p.m. on August 30, 1990 at the Plant City Public Library in Plant City, Florida to outline the remedial alternatives described in the RI/FS report and to present EPA's proposed remedial alternative for the soil, sediment, surface water, groundwater, and marsh contamination.

The responsiveness summary, required by Superfund policy, provides a summary of citizen's comments and concerns identified and received during the public comment period, and EPA's responses to those comments and concerns. All comments received by EPA during the public comment period will be considered in EPA's final decision for selecting the remedial altenative for addressing site risks.

A June 4, 1990 U.S. EPA Memorandum from the Office of Emergency and Remedial Response and Office of Waste Programs Enforcement determined that responsiveness summaries should reflect a genuine attempt to come to grips with citizens' questions and concerns. The Memorandum outlined the procedure to satisfy the needs of the public and suggested that the concerns of the local individuals who have identified themselves as living in the immediate vicinity of the site be addressed by presenting these concerns in the responsiveness summary. However, no citizens identified themselves as living in the immediate vicinity of the SMC site. Most of the attendees at the public meeting were officials or representatives of officials. The two comment letters received regarding the proposed plan and RI/FS were from the potentially responsible parties and a local official.

This responsiveness summary is organized into sections and appendices as described below:

I. Responsiveness Summary Overview. This section outlines the purposes of the public comment period and the Responsiveness Sumary. It also references the appended background information leading up to the public comment period.

II. Background on Community Involvement and Concerns. This section provides a brief history of community concerns and interests regarding the SMC site.

III. Summary of Major Questions and Comments Recieved During the Public Meeting and EPA Responses to these Comments. This section summarizes the oral comments received by EPA at the August 30, 1990 public meeting, and provides EPA's responses to these comments.

IV. Written Comments Received During the Public Comment Period and EPA Responses to these Comments. This section contains the comments in the two letters received by EPA during the 4 week public comment period, as well as EPA's responses to these comments.

V. Remaining Remedial Design/Remedial Action (RD/RA) Concerns. This section contains the community's comments and concerns that EPA should be aware of in design and implementation of the wetland alternative.

Appendix A: The Proposed Plan Fact Sheet which was distributed to the public prior to and during the public meeting.

Appendix B: The sign-in sheet from the Public Meeting held on August 30, 1990 in the Plant City Public Library.

II. Background on Community Involvement and Concerns

The Plant City community has been aware of the contamination problem at the SMC site for several years. The community relations activities were coordinated by the Florida Department of Environmental Resources (FDER) during the RI/FS. FDER and EPA conducted the following community relations activities for the SMC site:

During the RI/FS, background information on the SMC site was provided to city and state officials. Officials were encouraged to keep their constituents informed about the status of the site. EPA and FDER responded to inquiries about the site from state and city officials and private citizens.

A repository for reports pertaining to the site at the Plant City Public Library was established.

A meeting with the Plant City Manager and Plant City Engineer was held in January 1988.

EPA and FDER visited the surrounding community by going door to door in January, 1988. Concerns about the site were noted; however, community interest was minimal.

A Fact sheet was distributed to announce the completion and availability at the Plant City Public Library repository of the RI, as well as to inform citizens of an upcoming public meeting in February, 1988.

EPA and FDER held a public meeting in February 1988, to present the results of the RI and respond to community concerns.

A mailing list of interested parties was compiled to identify citizens and officials who receive information such as site fact sheets.

The Feasibility Study (FS) was released for public review and comment in August 1989.

A proposed plan was released in August 1989, to announce a public meeting and preferred alternative for remediation.

The August 1989, public meeting was postponed until the SMC wetlands could be studied further.

A community relations plan, August 1989, is prepared to address EPA's and FDER's role regarding community activities for the SMC site.

Public comment period held in August and September, 1989 and no comments are received.

The community relations plan and mailing list were updated in August 1990.

A proposed plan was sent out announcing the August 1990 public comment period and public meeting.

A public comment period on the RI/FS and FS wetland addendum is held from August 17, 1990 to September 14, 1990.

A public meeting is held at the Plant City Public Library on August 30, 1990 to present EPA's preferred alternative for the SMC site.

The surrounding neighborhood of the Schuylkill Metals facility was solicited in January 1988, for their comments regarding the site. Most residents were not concerned with any problems from the site. During the public meeting held in February 1988 to present the results of the Remedial Investigation, no concerns were expressed by the attendees about site-related problems.

As part of EPA's responsibility and commitment to the Superfund Program, the community has been kept informed of ongoing activities conducted at the SMC site. EPA has established information repositories where relevant site documents may be reviewed. Documents stored at the Plant City Public Library repository include the RI/FS report, the FS Addendum for the wetlands, the Wetland Impact Study, Proposed Plan Fact Sheet, and the public meeting transcript.

III. Summary of Major Questions and Comments Received During the Public Comment Period and EPA's Responses to these Comments

Oral comments raised during the Schuylkill Metals Corporation public meeting are summarized below together with EPA's responses to these questions and comments.

Comment: One attendee at the Public Meeting inquired whether contaminants have left the premises.

Response: Contaminants have left the premises, as defined by property boundaries. Lead was detected on multiple occasions north of the property boundary, which transects the east marsh. In addition, elevated concentrations of lead were detected on two surface water samples taken in the drainage culvert, located north and south of the railroad.

Comment: One attendee inquired as to the direction of groundwater flow.

Response: Regionally, groundwater in the surficial aquifer is moving in a easterly direction, reflecting the topography. Locally, in the vicinity of the former holding pond, movement is radial due to groundwater mounding.

Comment: One attendee inquired as to when cleanup would begin.

<u>Response</u>: Remedial action is anticipated to begin in 1991. Schuylkill Metals Corporation has prepared initial Remedial Design plans.

<u>Comment</u>: One attendee expressed that inundation of the east marsh may not be straightforward.

<u>Response</u>: During the Remedial Design a hydrologic study will be developed to permit design of the overflow weir.

<u>Comment</u>: One attendee inquired whether health risks exist for people that live in the vicinity.

<u>Response</u>: It has not been determined that humans are at risk, rather, the risk is primarily to the ecosystem. Risk to humans may exist in the future if the site is not remediated; however, the proposed remedy for the ecosystem shall also protect potential threat to human welfare.

<u>Comment</u>: One attendee inquired as to how deep groundwater has been contaminated.

<u>Response</u>: A 50 foot thick confining unit, which is predominantly clay should retard deeper migration of contaminants. Long-term monitoring of the intermediate aquifer will insure that the population is not exposed.

<u>Comment</u>: One attendee suggested that by leaving the wetlands intact, the Agency would, in fact, be attracting organisms to an area where they would be exposed to toxic levels of lead.

<u>Response</u>: The Agency recognizes that there is likely to be some impact to aquatic life and that the habitat is going to be impaired; however, the value of that habitat is more important than the anticipated impacts from exposure to contaminated sediments. (See the response to the final written comment on page 7).

<u>Comment</u>: One attendee inquired whether the estimated cost of the Remedial Action could conceivably escalate to the point where it is so expensive that work would have to stop.

<u>Response</u>: The estimated $ 6.2 million cost for Remedial Action reflects adjustment for an anticipated rate of inflation and future operation and maintenance cost. Thus, provided the scope of the Remedial Action does not change significantly, the estimated cost should not increase substantially.

IV. <u>Written Comments Received During the Public Comment Period and EPA Responses to these Comments</u>.

The written comments from the two letters regarding the SMC site have been summarized below, together with EPA's responses to these questions and comments.

<u>Comment</u>: One commenter noted that the proposed remediation goal for lead in the groundwater should be 50 ppb (based on Florida's Ground Water Rule), as opposed to EPA's cleanup goal of 15 ppb.

Response: CERCLA and SARA require that Superfund remedies must be protective of human health and the environment, and also specify the use of State requirements as cleanup goals only if more stringent than Federal standards. Lead concentrations of 50 ppb are no longer believed to be protective of human health. Available data on blood lead levels in children indicate that levels above 10 micrograms per deciliter (ug/dL) of blood are associated with increased risk of potentially adverse impacts on neurological development and diverse physiological functions. In addition, lead levels of 15 ppb in drinking water correlate well with blood lead levels of 10 ug/L.

In addition, the surficial aquifer in the vicinity of Plant City is classified as a Class II aquifer. A well survey conducted during the RI/FS identified 23 wells described as shallow or installed to a depth of less than 25 feet within a 0.5 mile radius of the site.

Based on the above, the Office of Emergency and Remedial Response recommends that a final cleanup level of 15 ppb for lead in groundwater usable for drinking water is protective.

Comment: One commenter suggested that a treatability study should be undertaken to determine whether the contemplated treatment technology for groundwater will result in attainment of the ARAR.

Response: The Agency recognizes the need for treatability studies in order to identify the specific technology required for attainment of the groundwater ARAR. It is anticipated that this shall be undertaken as part of the Remedial Design.

Comment: One commenter was concerned that the Consent Decree should contain a mechanism for a statistical evaluation of monitoring data during the pump and treat operation. Such an evaluation would identify potential residual concentrations of lead above 15 ppb, notwithstanding extended groundwater withdrawal.

Response: Should groundwater concentrations reach asymptotic concentrations above the 15 ppb cleanup goal, it may be necessary to amend the ROD and waive certain groundwater requirements. The protocol for determining when these levels are reached shall be determined during the Remedial Design.

Comment: One commenter inquired whether sufficient monitoring of soil, sediment, surface water or groundwater had been performed to determine whether migration had occurred off-site.

Response: Soil contamination occurred as a result of on-site burial of battery casing material. Subsurface borings conducted during the Remedial Investigation determined the horizontal, and to a lesser extent, the vertical extent of soil contamination. Two sediment samples were taken at off-site locations during the Remedial Investigation. These were found to be at background levels and considerably below those concentrations found in the marshes and ditch. Surface water samples were also taken at two off-site locations during the Remedial Investigation. In both instances, lead concentrations were found at elevated concentrations.

One off-site temporary monitoring well was sampled during the Remedial Investigation. Lead concentration in this well was found to be 0.03 mg/L. Approximately 23 shallow domestic wells were identified during the RI, located within a 0.5 mile radius of the site. These wells have not been sampled as part of the RI. Currently, the EPA is evaluating county well records for groundwater heavy metal concentrations in the site vicinity, including downgradient locations. Additional necessary offsite sampling will be addressed during remedial design.

Comment: One commenter noted that the precise numerical value of the federal ambient water quality criterion (AWQC) for lead for the east marsh should be dependent upon the hardness of the water in the marsh system.

Response: EPA agrees with this comment. The AWQC as it is adjusted for water hardness will be the cleanup goal for treated waters discharged to the east marsh. The numerical value established by EPA has calculated the site's specific water hardness into its determination of the cleanup goal for the east marsh surface water.

Comment: One commenter suggested the procedure to define the extent of functional loss to the wetlands and the amount of mitigation for such loss be outlined in the Consent Decree for the Remedial Design and Remedial Action.

Response: We agree that the Consent Decree should contain a provision defining the extent of mitigation required to compensate for adverse impacts observed as a result of site-specific contamination of the wetlands. These impacts are not based upon assumed functional losses, but are based upon observed toxic effects, bioaccumulation in fish tissues and violations of Ambient Water Quality Criteria (AWQC) for the protection of aquatic life. These observed impacts and effects clearly indicate that the ability of aquatic organisms to fully utilize these wetlands as habitat is impaired by toxicity associated with site-specific contamination, mainly lead.

Mitigation, at a minimum, should consist of a one-for-one replacement of impacted and/or impaired areas with uncontaminated (and therefore presumably fully functional) wetland areas. This recommendation is based upon an approach to wetlands protection that recognizes the value of habitat for aquatic and wetlands species in addition to the value of preventing unacceptable levels of adverse impacts associated with exposure of wildlife species to toxic contaminants. One principle that should be kept in mind is that, in the assessment of exposure to toxics, the concept of protecting individuals of a given species is applicable only to humans (and perhaps to small local populations of threatened or endangered species). In assessing exposure to other species, the overall guiding principle is to maintain a breeding population of sufficient size such that the species, rather than individual members of that species, is not threatened or endangered. By leaving some contamination in place at the existing marshes at the site, aquatic and wetlands species will be exposed to toxic effects, reducing the ability of that sub-population to fully utilize that impacted habitat. By providing mitigation in the form of restored or reconstructed wetlands, however, a habitat is provided that can be utilized to the maximum extent possible, in addition to the remaining impaired wetlands which now exist. This insures that the species populations in the area do not experience any loss of fully functional habitat, protecting the long-term viability of those species.

V. Remaining Remedial Design/Remedial Action (RD/RA) Concerns.

Public comments and concerns that EPA should be aware of during design and implementation of the wetland alternative will be addressed in the remedial design. Remedial design documents (i.e. Remedial Design Work Plan, Remedial Design Reports) will be available in the public repository in a timely manner to appraise the community of project progress. The community will be made aware of any major changes to the remedy made during project design.

APPENDIX A

PROPOSED PLAN FACT SHEET

EPA

SUPERFUND PROPOSED PLAN FACT SHEET

SCHUYLKILL METALS CORPORATION SITE

Plant City, Florida **August 1990**

INTRODUCTION

This *Proposed Plan* Fact Sheet on the Schuylkill Metals Corporation site (SMC site) in Plant City, Hillsborough County, Florida has been prepared by the Region IV office of the U.S. Environmental Protection Agency (EPA). Terms in *italic* print are defined in a glossary at the end of this publication.

This Proposed Plan identifies the *preferred alternative* for cleaning up the SMC site. In addition, the Proposed Plan includes summaries of other alternatives analyzed for this site. EPA, in consultation with the Florida Department of Environmental Regulation (FDER), will select a final remedy for the site only after the public comment period has ended and the information submitted during this time has been reviewed and considered by both agencies.

EPA is issuing the Proposed Plan as part of its public participation responsibilities under section 117(a) of the *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).* The Proposed Plan summarizes information that can be found in greater detail in the *Feasibility Study (FS)* Report, Wetland Addendum to the FS and other documents contained in the *Administrative Record* for this site. EPA and the State encourage the public to review these documents to gain a more comprehensive understanding of the site and the site-specific Superfund activities that have been conducted. The Administrative Record, a file which contains the information upon which the selection of the response action will be based, has been placed at the *information repository* located at the:

Plant City Public Library
501 North Wheeler Street
Plant City, Florida 33566
(813) 752-8685
Contact: Mrs. Treva Moore

SITE BACKGROUND

The SMC facility is located at 402 South Woodrow Wilson Street in the southwestern portion of Plant City, Florida. The facility covers an area of approximately 17.4 acres; an 8-foot chain-link fence and locked entry gates surround all but the east side of the property, which is bounded by marsh land (See Figure 1).

In 1972, SMC began operations as a battery recycling facility. The rubber and plastic battery casings were chipped and initially used for fill in the process area and later marketed for reclamation. Prior to 1981, acidic wastewater from the washdown of battery chips was stored onsite in an

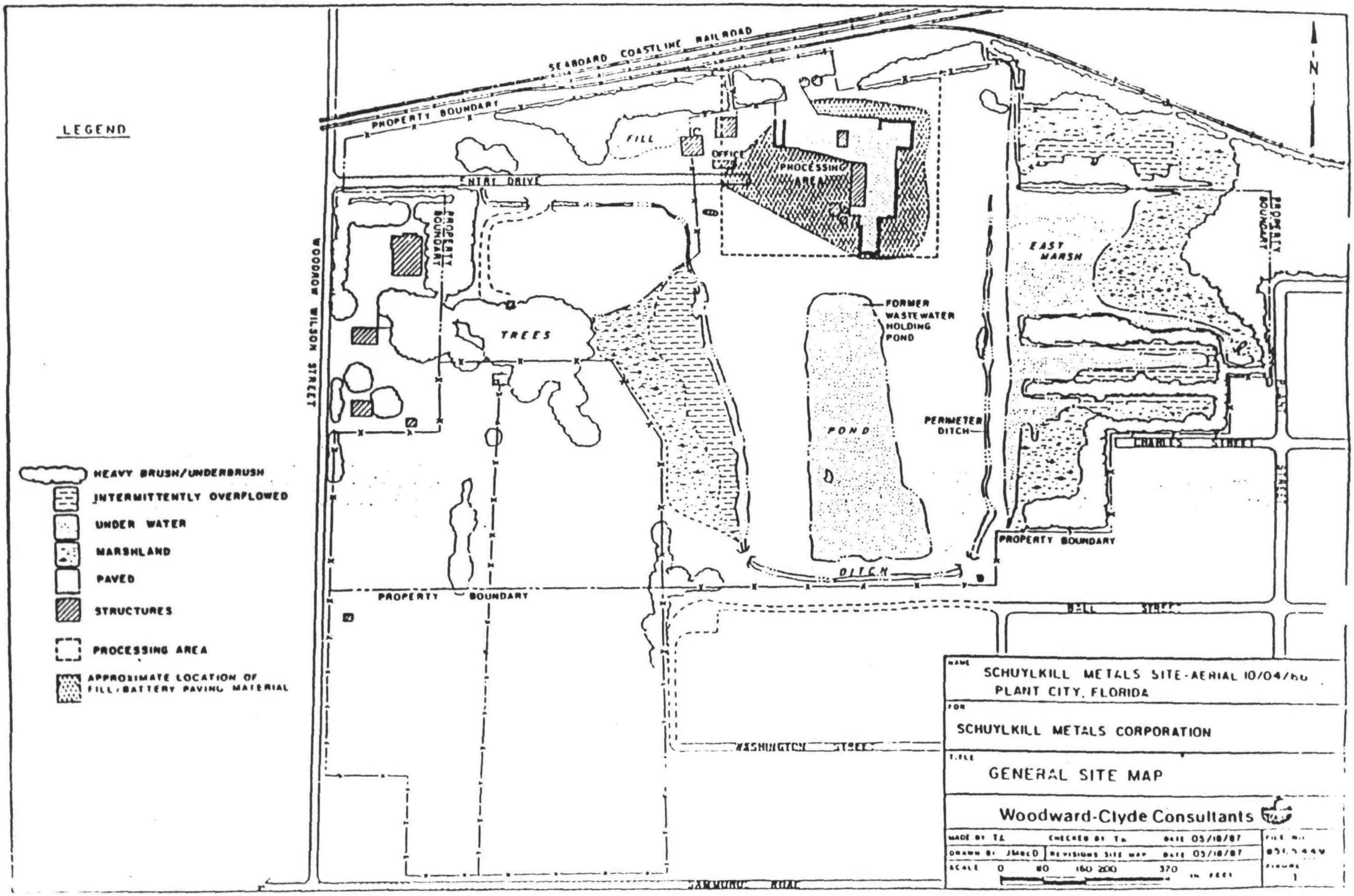
Dates to Remember

- Public comment period on remedial alternatives; August 17 - September 14, 1990

- Public Meeting
  Date: August 30, 1990
  Time: 7:00 p.m.
  Place: Plant City City Hall
  301 Wheeler Street
  Plant City, Florida 33566
  (813) 752-3125

Figure 1

Site Location Map



approximately 2.2 acre, unlined holding pond. Initially lime, and later ammonia, were used for pH adjustment of the waters stored in the holding pond. Acidic water discharges to the holding pond ceased after 1981. In June 1986, SMC's Plant City facility discontinued operations as a battery recycling facility.

Data collected from an initial investigation carried out by the *Field Investigation Team (FIT)*, was used to develop a *Hazard Ranking System (HRS)* score. The site received a score of 59.19. Sites receiving an HRS score of 28.5 or above may be added to the *National Priorities List (NPL)*. The SMC facility was placed on the NPL in 1982. FDER and SMC entered into a *Consent Order* in January 1986, requiring SMC to perform a *remedial investigation/feasibility study (RI/FS)* as required by CERCLA. Sampling results indicated elevated levels of lead and chromium in the surficial *aquifer*, and elevated levels of lead in the holding pond surface water, perimeter ditch, process area soils, and marsh. In 1989, EPA conducted additional studies on two marshes located on the western and eastern portions of the site and developed a Wetland Addendum to the FS in 1990 regarding marsh remediation. Sampling results from the additional studies detected levels of lead exceeding Florida Water Quality Standards in marsh surface water.

SCOPE OF PROPOSED ACTION

As indicated in the RI/FS, the site in its present condition poses a minimal threat to public health, though trespassers could be at a risk through direct contact with or ingestion of contaminated media. However, if left unremediated, lead-bearing soils at the site could serve as a source for future contamination of area surface water and *groundwater*. The present state of contamination within the marshes poses a threat to the environment. Lead exceeded safe levels in the groundwater; however only in the upper aquifer. The deeper aquifer, the source for drinking water, currently shows no evidence of contamination from this site. The remedy proposed addresses these concerns by treating all areas of contamination.

SUMMARY OF REMEDIAL ALTERNATIVES ANALYZED

This section addresses the *remedial alternatives* identified and evaluated in: 1) The FS Report for soil, surface water, and groundwater remediation; and 2) The Addendum to the FS for marsh remediation.

Soil, Surface Water, and Groundwater Remediation

The FS evaluated 16 alternatives in detail for remediation of the soils in the processing area, pond and ditch; surface water; and groundwater. Each alternative falls into one of the following general categories:

* No Action (Alternative 1). The Superfund program requires that the "No Action" Alternative be evaluated at every site to provide a baseline for evaluation of other alternatives. Under this alternative, EPA would take no further action at the site to prevent exposure to the contaminants except to continue *groundwater monitoring*.

* Source containment with groundwater collection and treatment (Alternatives 2, 3, 4, 5). This involves capping contaminated soils and installing a *slurry wall* to minimize *leaching* of soils and migration of contaminated groundwater. Groundwater and surface water would be treated by *ion medium filtration* or *electrochemical precipitation* with *clarification* or *microfiltration*.

* Source removal, offsite disposal and groundwater collection and treatment (Alternatives 6 and 7). This category involves excavation of contaminated soils/sediments with offsite disposal at a permitted hazardous waste disposal facility. Groundwater and surface water would be treated as stated above.

* Source removal, onsite treatment, offsite disposal and groundwater collection and treatment (Alternatives 8, 9, and 10). This category involves *chemical fixation/heap leaching* of contaminated soils/sediments with offsite disposal of separated debris. Groundwater/surface water would be treated as stated above.

* Source removal, onsite treatment and groundwater collection and treatment (Alternatives 11, 12, 13). This category involves chemical fixation or heap leaching of contaminated soils/sediments and onsite *incineration* of separated debris. Groundwater and surface water would be treated as stated above.

* Source removal, onsite treatment, debris recycling and groundwater collection and treatment (Alternatives 14, 15, 16). This category involves chemical fixation or heap leaching of contaminated soils/sediments and

recycling of separated debris. Groundwater and surface water would be treated as stated above.

For a detailed listing and explanation of all alternatives considered, please refer to the FS Report, available at the information repository.

Marsh Remediation

The Addendum to the FS evaluated the following four alternatives for marsh remediation:

Alternative 1: No Action. The Superfund program requires that the "No Action" Alternative be evaluated at every site to provide a baseline for evaluation of other alternatives. Under this alternative, EPA would take no further action at the site to prevent exposure to the contaminants, except monitoring, and requires no compensation for damage to wetlands.

Alternative 2: Mechanical controls. This alternative involves fencing and monitoring for the west marsh and flood control gates to provide continued surface water *inundation*, resulting in *anaerobic* sediments and monitoring for the east marsh.

Alternative 3: Low permeability cover, *mitigation*, and monitoring. This alternative involves installing a clay cap over the wetland to minimize leaching of contaminants and diversion drainage ditches to control surface water runoff.

Alternative 4: Sediment removal. This alternative involves sediment removal to a depth of two feet and solidification of sediments, and (a) onsite natural contour restoration of the area between the two marshes or (b) backfilling with surface contouring for flood control, and monitoring including *biomonitoring*.

EVALUATION OF ALTERNATIVES

This section compares the performance of the alternatives identified in the FS Report and Addendum to the FS against the nine criteria that are required to be used to evaluate Superfund remedies. The evaluation criteria, summarized below, are specified in EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OSWER Directive 9355.3-01). A summary of the evaluation criteria is provided in a chart on page 5 of this fact sheet.

Soil, Surface Water and Groundwater Remediation

The "No Action" Alternative was eliminated from detailed evaluation on the basis that it is not protective of human health and the envir[illegible] other alternatives would fulfill th[illegible] obje[illegible] alternatives except the first wou[illegible] [illegible] ARARs and could be effecti[illegible] [illegible] Alternatives 2-7 would require minim[illegible] implement and thus be most effective in term; however, though Alternatives 8-16 [illegible] longer to implement, they would have an [illegible] impact in attaining cleanup goals. In term term effectiveness, Alternatives 2-5 permanent solutions and do not ad[illegible] concern; Alternatives 6 and 7 provide [illegible] solution for this particular site, but n[illegible] hazardous material itself; the long-term Alternative 8-16 are unknown, but based studies are believed to have long-term eff[illegible] Alternatives 8-16 reduce the toxicity or [illegible] contaminants at the site; Alternatives 2 an[illegible] reduce toxicity. Costs for Alternatives from approximately $3 to $5 million, Alte[illegible] 7 from $16 to $183 million and Alterna[illegible] from $6 to $10 million. EPA will co[illegible] FDER on the alternative that will be im[illegible] at the site; acceptance by the communi[illegible] evaluated based on comments received at meeting and during the public comment [illegible]

As a result of the evaluation an[illegible] comp[illegible] possible alternatives, two specifi[illegible] [illegible]nat[illegible] determined to best satisfy the eva[illegible]ion [illegible] a whole. The alternatives determi[illegible] appropriate in the FS for soil, surface[illegible] groundwater remediation are:

Alternative 5c: Installation of a slurry w[illegible] process area soils, installation of leachate trenches in the process area soils, cappi[illegible] soils with an impermeable membrane su[illegible] and treatment of surface waters and gro[illegible] with ion medium filtration.

Alternative 15c: Excavation of process [illegible] and sediments from the ditch, separatio[illegible] and debris by screening, treatment of sediments by chemical fixation, grin[illegible] washing of debris for recycling and tre[illegible] surface waters and groundwater by ion filtration. Verification sampling of [illegible] sediments would be conducted to as[illegible] cleanup goals are met.

Marsh Remediation

The "No Action" Alternative (A[illegible] [illegible]ati[illegible] eliminated from detailed evalua[illegible] [illegible]on that it is not protective of huma[illegible] [illegible]ealt[illegible] environment; all other alternatives would objective.

SUMMARY OF EVALUATION CRITERIA

- **Overall Protection of Human Health and the Environment** – Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** –Addresses whether or not a remedy will meet all of the ARARs or Federal and State environmental statutes and/or provide grounds for invoking a waiver.
- **Long-Term Effectiveness and Performance** – Refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.
- **Reduction of Toxicity, Mobility, or Volume Through Treatment** – Refers to the anticipated performance of the treatment technologies that may be employed in a remedy.
- **Short-Term Effectiveness** –Refers to h the remedy achieves protection, as potential adverse impacts on human t the environment that may occu construction and implementation of th
- **Implementability** – Refers to the tec administrative feasibility of a remedy, the availability of materials and service for implementation.
- **Cost** – Includes capital and oper maintenance costs.
- **State Acceptance** – Indicates whether its review of the RI/FS and Propose State concurs with, opposes, or has n on the preferred alternatives.
- **Community Acceptance** –Assessed in *of Decision (ROD)* following a revi public comments received the followin Plan.

Alternative 2, mechanical controls, would be implemented in the least amount of time and achieve the goal of maintaining existing functional value of the east marsh. Additional time would be required for implementation of Alternative 4, sediment removal and solidification. Alternative 3, capping, would require less time for implementation than Alternative 4. Alternative 2, fencing for the west marsh does not provide a long-term solution. The long-term effects of Alternative 2 for flooding the east marsh, and Alternative 4 for sediment solidification of both marshes are unknown at this time. However, based on site-specific studies, it is anticipated that Alternatives 2 for flooding the east marsh and 4 would provide long-term effectiveness. Alternative 3, capping, would also provide long-term effectiveness. Alternative 2 for the east marsh and Alternative 4 would both reduce the toxicity or mobility of contaminants at the site; however Alternative 4 may increase the mobility of contaminants in the short-term. Alternative 2 for the west marsh and Alternative 3 do not reduce toxicity. The cost estimated for the alternatives are: Alternative 2, east marsh - $674,000; Alternative 2, west marsh - $214,000; Alternative 3 - east marsh - $3,255,00; Alternative 3, west marsh - $978,000; Alternative 4(a), east marsh - $1,047,000 - $1,641,000; Alternative 4(a) west marsh - $545,000; Alternative 4(b), east marsh - $4,676,000 - $8,411,000; and Alternative 4(b), west marsh - $2,572,000 - $2,664,000.

The total cost for site cleanup is estim between $7 - $15 million.

PREFERRED ALTERNATIVES

Soil, Surface Water and Groundwater

Although Alternative 5c is the less ex two, Alternative 15c is deemed environmentally sound as it eliminate simply contains the source of conta imposes fewer limits on future Alternative 15c is therefore the altern by FDER and EPA for soil, surfa groundwater remediation at the SMC

Marsh Remediation

The preferred alternative is Alte combination with Wetland mitigatio 2 includes flooding the east marsh a west marsh. Extensive biomonitoring performed at both marshes. Implem be achieved within a short period of t maintain the present functional v marshes. This alternative provid protection from cattle and human e west marsh, and long-term exposure both marshes. Flooding would redu of metal contamination. This alte accepted by the State and is cost eff and sediment removal do not meet criteria, and capping is not consider and sediment removal do not meet either of these criteria, and capping is not considered a treatment.

However, Alternative 2 requires mitigation to replace loss in the functional value of the marshes. Creation or enhancement of a wetland will compensate for the functions lost or affected in these marshes. The location, size, and number of the wetlands will be determined by the State and EPA. The result will be an overall increase in the acreage of wetlands.

THE COMMUNITY'S ROLE IN THE SELECTION PROCESS

EPA solicits input from the community on the cleanup methods proposed for each Superfund response action. EPA has set a public comment period from August 17 - September 14, 1990, to encourage public participation in the selection process. The comment period includes a public meeting near the site during which EPA and FDER will present the Proposed Plan, answer questions, and accept oral and written comments.

Comments will be summarized and responses provided in the *Responsiveness Summary* section of the ROD. To send written comments or obtain further information, contact:

Barbara Dick
Remedial Project Manager
South Superfund Remedial Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365
(404) 347-2643

Betty Winter
Community Relations Coordinator
South Superfund Remedial Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365
(404) 347-2643

As part of the Superfund program, EPA is providing communities with the opportunity to apply for Technical Assistance Grants (TAGs). These grants (one per site up to $50,000) are designed to enable community groups to hire a technical advisor or consultant to assist them in interpreting or commenting on site findings and proposed remedial action plans.

Citizens who are interested in the TAG program may obtain an application package by calling or writing the following EPA Region IV Technical Assistance Grants Contact:

Denise Bland
Technical Assistance Grants Specialist
Grants and Contracts Support Unit
U.S. Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365
(404) 347-2234

GLOSSARY

Administrative Record: A file which is maintained and contains all information used by the lead agency to make its decision on the selection of a response action under CERCLA. This file is required to be available for public review and a copy is to be established at or near the site, usually at an information repository. A duplicate file is maintained in a central location, such as a regional EPA and/or State office.

Anaerobic: Where there is no air or free oxygen.

Aquifer: An underground rock formation composed of material such as sand, soil, and/or gravel that can store and supply groundwater to wells and springs.

Biomonitoring: The periodic evaluation of organisms residing in a defined area.

Chemical Fixation: A technique where contaminated soils are combined with other ingredients (commonly cement) which immobilize the contaminants.

Clarification: A process in which liquid is made clear and freed from impurities or contaminants.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a trust fund, commonly known as Superfund, to investigate and cleanup abandoned on uncontrolled hazardous waste sites. Under the program, EPA can either pay for site cleanup when the responsible parties cannot be located or are unwilling or unable to perform the work, or take legal action to force responsible parties to cleanup the Superfund site or reimburse EPA the cost of the cleanup.

Consent Order: A legal agreement between the state and the potentially responsible parties (PRPs) whereby the PRPs agree to perform or pay the cost of a site cleanup. The agreement describes actions to be taken at a site.

Electrochemical Precipitation: A technique where an electrical current is applied to contaminated water causing contaminants to precipitate. The precipitate is then separated from the water by settling (clarification) or by passing the water through a fine filter (microfiltration).

Feasibility Study (FS): See Remedial Investigation/Feasibility Study (RI/FS).

Field Investigation Team (FIT): A team of EPA personnel who conduct field studies to determine if a site poses a significant enough potential risk to warrant an investigation.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel. In an aquifer, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

Groundwater Monitoring: The periodic evaluation of the hydrogeologic conditions and quality of groundwater underlying the site.

Hazard Ranking System (HRS): A scoring system used by EPA and the State to evaluate relative risks to public health and the environment from releases or threatened releases of hazardous substances. An HRS score is calculated based on actual or potential release of hazardous substances through the air, soils, surface water or groundwater. If a site scores above 28.5, the HRS score is a primary factor in the placing of that site on the National Priorities List.

Heap Leaching: A technique where a solvent is used to remove lead from soil, rendering it non-hazardous. The lead is then recovered from the solvent solution for recycling.

Incineration: Burning of certain types of solid, liquid, or gaseous materials under controlled conditions to destroy hazardous waste.

Information Repository: A file containing current information, technical reports and reference documents regarding a Superfund NPL site. The information repository is usually located in a public building that is convenient for local residents, such as a public school, city hall, or a library. As the site proceeds through the Superfund Remedial Process, the file at the information repository is continually updated.

Inundation: To cover with or as with a flood, deluge.

Ion Medium Filtration: A technique where contaminated water is circulated through a "metal grabber" medium which extracts metals from the water.

Leaching: The extraction of a soluble substance from a material caused by water filtering down through the material.

Microfiltration: The separation of very small particles or impurities from a liquid by means of a filter.

Mitigation: The reduction of hazards posed by an NPL site to human health and the environment.

National Priorities List (NPL): A listing of the most serious, uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using Superfund monies. The list is updated yearly as required by the National Contingency Plan of CERCLA. Sites are placed on the NPL based on their HRS score.

Preferred Alternative: After evaluating and examining the various remedial alternatives, EPA selects the best alternative based on relevant cost and non-cost factors.

Proposed Plan: A public participation requirement of SARA in which EPA summarizes for the public the preferred cleanup strategy and the rationale for the preference, reviews the alternatives presented in the detailed analysis of the remedial investigation/feasibility study, and presents any waivers to cleanup standards of §121(d)(4) which may be proposed. This may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under Agency consideration.

Record of Decision (ROD): A public document that explains which cleanup alternative will be used at a National Priorities List site and the reasons for choosing that cleanup alternative over other possibilities.

Remedial Alternatives: A list of the most technologically feasible alternatives for a remedial strategy.

Remedial Investigation and Feasibility Study (RI/FS): Two distinct but related studies, normally conducted together, intended to define the nature and extent of contamination at a site (RI) and to evaluate appropriate, site-specific remedies necessary to achieve final cleanup at the site (FS).

Responsiveness Summary: A summary of oral and/or written public comments received by EPA during a comment period.

Slurry Wall: An impermeable wall that is installed in the subsurface surrounding contaminated soils. Composed of a mixture of soil and clay, this wall will prevent contaminant migration.

MAILING LIST ADDITIONS

To be placed on the mailing list for the Schuylkill Metals Corporation Site
please complete this form and mail to:
Ms. Betty Winter
Community Relations Coordinator, U.S. EPA, Region IV
345 Courtland Street, NE, Atlanta, GA 30365

Name ______________________________

Address ______________________________

Affiliation ______________________________

Telephone ______________________________

APPENDIX B

PUBLIC MEETING SIGN-IN SHEET

Schuylkill Metals Corporation Site
Public Meeting Sign In Sheet
August 30, 1990

Name	Address	Telephone Number	Affiliation	Do you want to be included on the mailing list?	How did you learn about this meeting?
-UD NABONG	P.O. DRAWER C PLANT CITY, FL 33564	752-3125	CITY OF PLANT CITY	YES	
Elmer Akin	1044 Chestnut Hill Cir. Marietta GA	404 347-1586	EPA		
Betty Winter	EPA - Reg IV	404 347-2643	EPA		
BOB LEIGHTON	14502 N DALE MABRY	960-9767	AWD		
Joe Rodenmiller	404 S. Mahoney St.	752-1953	SMC		
Chuck Heintz	EPC	272-5788	EPC		
AL TOBIN	CLERMONT, FL 13400 MONROE RD	(904) 394-8601	OHM CORP		
Muriel Tibbetts	102 S. Evers St	752-3113	The Courier		
GEROLD MORRISON	7601 HWY 301 N. (TAMPA)	985-7481	SWFWMD - SWIM	YES	
JERI BRECKEN	1324 STILLWOOD CHASE	233 1236	EPA		
Delbert Hicks	EPA, College Sta. Rd. 30613	404/546-2294	EPA		
[illegible] R. Allen	105 So. ALEXANDER	754 1504	IPC	YES	
Scott Ankeney for Congressman Bilirakis			1100 Cleveland St, Ste 1600 Clearwater 34615	yes	441-3721
Tom Toombs	105 S Alexander Street Plant City FL 33566	754-2373	International Environmental Services	Yes	
[illegible]	1004 W Mahoney St PC	754 2385	citizen	yes	paper
[illegible]	P.O. Drawer C Plant City FL 33564	754-3125	City of Plant City		