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CORRECTIVE ACTION ORDER

ISSUED PURSUANT TO

SECTION 3008(h) OF RCRA

U.S. STEEL GARY WORKS

IND 005 444 062

FEBRUARY 1998

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF: USX CORPORATION Acting Through U.S. Steel Group ONE NORTH BROADWAY GARY, INDIANA IND 005 444 062 RESPONDENT.	)))))))))))))	ADMINISTRATIVE ORDER ON CONSENT U.S. EPA DOCKET NO.: Proceeding under Section 3008(h) of the Resource Conservation and Recovery Act of 1976, as amended, 42 U.S.C. §6928(h).

I. JURISDICTION

1. This Administrative Order on Consent (Order) is issued pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency (U.S. EPA) by Section 3008(h) of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. §6928(h). The authority vested in the Administrator to issue orders under §3008(h) of RCRA has been delegated to the Regional Administrators by U.S. EPA Delegation Nos. 8-31 and 8-32 dated April 16, 1985, and May 15, 1986, and has been further delegated by the Regional Administrator in Region 5 to the Director of the Waste, Pesticides and Toxics Division.

2. This Order is issued to USX Corporation (USX) acting through U.S. Steel Group, Respondent, the owner and operator of the Gary Works Steel manufacturing facility (the Facility) located at One North Broadway, Gary, Indiana.

3. Respondent consents to and agrees not to contest U.S. EPA's jurisdiction to issue this Order and to enforce its terms. Furthermore, Respondent will not contest U.S. EPA's jurisdiction to: compel compliance with this Order in any subsequent enforcement proceedings, either administrative or judicial; require Respondent's full or interim compliance with the terms of this Order; or impose sanctions for violations of this Order. Respondent's consent and agreement to the terms of this Consent Order shall not be construed in any way as an admission of liability for any violations of applicable Federal, State, and local environmental regulatory, and statutory requirements. The parties acknowledge that the Current Conditions Report required under this Order may contain findings that confirm or reveal more factual information than the findings contained in Section V (Findings of Fact) in this Order.

II. DEFINITIONS

Unless otherwise expressly provided herein, terms used in this Order which are defined in RCRA or in regulations promulgated under RCRA shall have the definitions given to them in RCRA or in such regulations.

1. Acceptable, in the phrase "In a manner acceptable to U.S. EPA..." shall mean that submittals or completed work meet the terms and conditions of this Order, attachments, scopes of work, approved workplans and/or U.S. EPA's written comments and guidance documents.

2. Additional work shall mean any activity or requirement that is not expressly covered by this Order or its attachments but is determined by U.S. EPA to be necessary to fulfill the purpose of this Order as presented in Section III: Statement of Purpose.

3. Administrative Record shall mean the record compiled and maintained by U.S. EPA supporting this Order.

4. Area of Concern shall mean any area of the Facility under the control or ownership of the owner or operator where a release to the environment of hazardous waste(s) or hazardous constituents has occurred, is suspected to have occurred, or may occur, regardless of the frequency or duration of the release.

5. CERCLA shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§9601, *et seq*.

6. Comply or compliance may be used interchangeably and shall mean completion of work required by this Order of a quality approvable by U.S. EPA and in the manner and time specified in this Order or any modification thereof, its attachments or any modification thereof, or written U.S. EPA directives. Respondent must meet both the quality and timeliness components of a particular requirement to be considered in compliance with the terms and conditions of this Order.

7. Contractor shall include any subcontractor, consultant, or laboratory retained to conduct or monitor any portion of the work performed pursuant to this Order.

8. Corrective Measures shall mean those measures or actions necessary to control, prevent, remediate or mitigate the release or potential release of hazardous waste or hazardous constituents that threaten or potentially threaten human health or the environment.

9. Corrective Measures Implementation or CMI shall mean those activities necessary to initiate, complete, monitor, and maintain the corrective measures U.S. EPA has selected or may select which are necessary and appropriate to protect

human health and/or the environment from the release or potential release of hazardous wastes, or hazardous constituents, into the environment at or from the Facility. The CMI requirements are detailed in the CMI Scope of Work included as Attachment V.

10. Corrective Measures Study or CMS shall mean the investigation and evaluation of potential remedies which will protect human health and/or the environment from the release or potential release of hazardous wastes, or hazardous constituents, into the environment at or from the Facility. The CMS requirements are detailed in the CMS Scope of Work included as Attachment IV.

11. Data Quality Objectives shall mean the qualitative or quantitative statements, the application of which is designed to ensure that data of known and appropriate quality are obtained.

12. Day shall mean a calendar day unless expressly stated to be a business day. Business day shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the end of the next business day.

13. EPA or U.S. EPA shall mean the United States Environmental Protection Agency, and any successor Departments or Agencies of the United States.

14. Facility shall mean Respondent's Gary Works steel manufacturing facility located at One North Broadway, Gary Indiana and all associated property under its ownership or control as described in Exhibit A hereto.

15. Hazardous Constituents shall mean those constituents listed in Appendix VIII to 40 CFR Part 261 or any constituent identified in Appendix IX to 40 CFR Part 264.

16. Hazardous Waste shall mean hazardous waste as defined in §1004(5) of RCRA or 40 CFR §260.10.

17. Interim Stabilization Measure(s) or ISM shall mean those actions which can be initiated in advance of or supplemental to implementation of the final corrective action for a Solid Waste Management Area, necessary to achieve the goal of stabilization. Interim Stabilization Measure(s) initiates cleanup at a facility and controls or eliminates the release or potential release of hazardous wastes or hazardous constituents at or from the Facility. The ISM requirements are detailed in the ISM Scope of Work included as Attachment I and Attachment III. To the greatest extent possible, the ISM will be consistent with and integrated

into the final Corrective Action Measure(s) selected for the facility, if any.

18. <u>Receptors</u> shall mean those humans, animals, or plants and their habitats which are or may be affected by releases of hazardous waste or hazardous constituents at or from the Facility.

19. <u>RCRA Facility Investigation or RFI</u> shall mean the investigation and characterization of the source(s) of contamination and the nature, extent, direction, rate, movement, and concentration of the source(s) of contamination and releases of hazardous waste and hazardous constituents that have been or are likely to be released into the environment at or from the Facility. The activities required for the RFI are detailed in the RFI Scope of Work included as Attachment II.

20. <u>Self-Implementing Stabilization Measures (SISM)</u> shall have have the same meaning as set forth in Attachment III.

21. <u>Solid Waste Management Unit or SWMU</u> shall mean any discernible unit at which solid wastes have been placed at any time irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a Facility where solid wastes have been routinely or systematically released.

22. Solid Waste Management Area or SWMA shall mean any area delineated and defined for implementation of the RFI and\or CMS, as required in Attachments II and III. The sub-area division of the Facility, subject to the approval of U.S. EPA, can be based on geology, geochemistry, geography, history of use or other criteria. The sub-areas may follow separate, approved sub-plans and schedules, but may be recombined or reconfigured at any point in the process, as to meet the requirements of this Order, RCRA, and its implementing regulations in accordance with provisions set forth in Attachments II, III and IV hereto.

23. Scope of Work or SOW shall mean the outline of work Respondent must use to develop all workplans and reports required by this Order as set forth in this Order and its Attachments II, III, and IV. All SOW Attachments and modifications or amendments thereto are incorporated into this Order and are an enforceable part of this Order.

24. Stabilization shall mean the goal or philosophy of controlling or abating imminent or potential threats to human health and/or the environment from releases and/or preventing or minimizing the spread of contaminants while long-term corrective measures alternatives are being evaluated.

25. Submittal shall include any workplan, report, progress report, or any other written document Respondent is required by this Order to send to U.S. EPA.

26. Violations of this Order shall mean those actions or omissions, failures or refusals to act by Respondent that result in a failure to meet the terms and conditions of this Order or its attachments.

27. Work or Obligation shall mean any activity Respondent must perform to comply with the requirements of this Order and its attachments.

28. Workplan shall mean the detailed plans prepared by the Respondent to satisfy the requirements of the corresponding Scope of Work. The requirements for each workplan are presented in Section VIII: Work to be Performed and the Attachments I-V.

III. STATEMENT OF PURPOSE

In entering into this Consent Order, the mutual objectives of the U.S. EPA and the Respondent are: (1) to perform U.S. EPA-approved Interim Stabilization Measure(s) (ISM) at the Facility to relieve imminent or potential threats to human health or the environment; and (2) to perform a RCRA Facility Investigation (RFI) to determine fully the nature and extent of any release of hazardous wastes and/or hazardous constituents at or from the Facility; (3) to perform a Corrective Measures Study (CMS) to identify and evaluate alternatives for the corrective action necessary to prevent or mitigate any migration or releases of hazardous wastes and/or hazardous constituents at or from the Facility which may threaten or potentially threaten human health or the environment; and (4) to implement the corrective measure or measures selected by U.S. EPA at the Facility; and (5) to perform any other activities necessary to correct or evaluate actual or potential threats to human health and/or the environment resulting from the release or potential release of hazardous waste or hazardous constituents at or from the Facility.

IV. PARTIES BOUND

1. This Order shall apply to and be binding upon EPA and Respondent and its officers, directors, employees, agents, and successors and assignees, and upon all persons, independent contractors, contractors, and consultants acting under or for Respondent.

2. No change in ownership or corporate or partnership status relating to the Facility will in any way alter Respondent's responsibility under this Order. Any conveyance of title, easement, or other interest in the Facility, or a portion of

the Facility, shall not affect Respondent's obligations under this Order. Respondent will be responsible for and liable for any failure to carry out all activities required of Respondent by the terms and conditions of the Order, regardless of Respondent's use of employees, agents, contractors, or consultants to perform any such tasks.

3. Respondent shall provide a copy of this Order to all contractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed pursuant to this Order within fourteen (14) days of the issuance of this Order or the retention of such person(s), whichever occurs later, and shall condition all such contracts on compliance with the terms of this Order.

4. Respondent shall give written notice of this Order to any successor in interest prior to transfer of ownership or operation of the Facility or a portion thereof and shall notify U.S. EPA in writing within thirty (30) days prior to such transfer.

5. Respondent agrees to undertake all actions required by the terms and conditions of this Order, including any portions of this Order incorporated by reference. Respondent waives any rights to request a hearing on this matter pursuant to §3008(b) of RCRA and 40 CFR Part 24, and consents to the

issuance of this Order without a hearing pursuant to §3008(b) of RCRA as a Consent Order issued pursuant to §3008(h) of RCRA.

V. FINDINGS OF FACT

The Director of the Waste, Pesticides and Toxics Division, U.S. EPA, Region 5, hereby makes the following findings of fact.

1. Respondent is a company doing business in the State of Indiana and is a person as defined in Section 1004(15) of RCRA, 42 U.S.C. §6903(15) and 329 Indiana Administrative Code (IAC) 3.1-4 and 40 CFR §260.10.

2. Respondent is a generator of hazardous waste and an owner and operator of a hazardous waste management facility located at One North Broadway, Gary, Indiana (The "Facility"). Respondent managed, treated, disposed of, and is engaged in the storage of hazardous waste at the Facility subject to interim status requirements, 329 IAC 3.1-10-1&2 and 40 CFR Part 265.

3. Respondent owned and operated its Facility as a hazardous waste management facility on and after November 19, 1980, the applicable date which renders facilities subject to interim status requirements or the requirement to have a permit under Sections 3004 and 3005 of RCRA, 42 U.S.C. §§6924 and 6925.

4. Pursuant to §3010 of RCRA, Respondent notified U.S. EPA of its hazardous waste activity. In its notification dated August 20, 1980, the Respondent identified itself as a generator and an owner/operator of a treatment, storage, and/or disposal facility for hazardous waste.

5. In its August 20, 1980 letter, USX submitted Notification of Hazardous Waste Activities, and identified itself as handling the following hazardous wastes at the Facility:

   a. Hazardous wastes exhibiting the characteristics of ignitability, corrosivity, reactivity, and EP or TC toxicity identified at 40 CFR §§261.20-261.24, (D001-D004);

   b. Hazardous wastes from non-specific sources identified at 40 CFR §261.31, (F001, F003, F005, F006, F007, F008, F009, F010, F011, and F016);

   c. Hazardous wastes from specific sources identified at 40 CFR §261.32, (K062, K063, and K087);

   d. Commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, or manufacturing chemical intermediates identified at 40 CFR §261.33(e) (P012, P022, P053, P106, and P120) and at 40 CFR §261.33(f) (U002, U012, U019, U032, U043, U044, U052, U056, U122, U123, U125, U134, U144, U147, U154, U159, U162, U169, U170, U188, U190, U220, U228, and U229).

6. Respondent's Facility:

   a. <u>FACILITY AND PROCESS DESCRIPTION</u>

   The Facility is located on the shore of Lake Michigan, in Lake County, Indiana, and is historically one of the world's largest steel-making plants. The Facility is situated at the north end of the City of Gary, and approximately 25 miles southeast of downtown Chicago. It extends along the south shore of Lake Michigan for approximately seven miles and ranges up to one mile or more wide. The western part of the facility is located near a fossil fuel power plant (NIPSCO), Union Carbide Plant, and the Gary Airport. The eastern portion of the facility shares a boundary with the Indiana Dunes National Lakeshore.

The U.S. Steel-Gary Works is a fully integrated steel-making facility. Construction of the Facility was begun in 1906 and steel production commenced in 1909. Currently, the Gary Facility has 57 production units situated on nearly 4,000 acres of land, and employs more than 7,000 people. The principal product is flat rolled steel sold in a variety of forms. Major process operations include coking and by-product recovery, sintering, iron-making in blast furnaces, steel-making in basic oxygen furnaces, and finishing mills (hot and cold rolling, tin plating, and galvanizing).

Facility operations are currently organized as follows:

o <u>Coke Plant</u> - Major process units include a coal yard, two pre-carbon units, four coke oven batteries, five quench towers and four quench tower sumps; and a by-product recovery system comprising eight tar pre-decanters, ten tar decanters, a tar dehydrator system, three primary coolers, three naphthalene separators, two ammonia scrubbers, three final coolers, three benzol scrubbers and a light oil recovery system.

- Iron Products Division - Major process operations include a three-line sinter plant, four blast furnaces and the ore docks.

- Steel Products Division - Major process operations include three basic oxygen furnaces in each of two shops (No. 1 BOP, No. 2 Q-BOP), and four continuous caster strands.

- Hot Strip Division - Major process operations include the 84-inch hot strip mill (comprising 5-stand roughing and 7-stand finishing mills), a roll shop, and several slab yards.

- Plate Products Division - Major process operations include a hot rolling mill, plate shearing, heat-treat furnaces, and a roll shop.

- Sheet Products Division - Major process operations include the North Sheet Mill Complex (5-stand cold reduction, recoil line, temper line and annealing), South Sheet Mill Complex (two temper lines, coil preparation, and annealing), three pickling lines, two hot dip galvanizing lines, one electro-galvanizing line, and two roll shops.

- Tin Products Division - Major process operations include cold reduction (6-stand), metal cleaning, two electrolytic tinning lines, a tin-free coating line, and a roll shop.

Facility operations have been dynamic, with the plant experiencing periods of rapid growth and expansion through the 1970s, and more recently periods of decline and reduction in production activities. The Facility once had more than 20,000 employees. A list of the production facilities which have been closed down since 1980 is presented as Table 1. This list is an approximation based on information collected in the file review and visual site inspections conducted in 1986, 1988 and 1994. Although not a complete list, it illustrates the magnitude in the reduction in manufacturing processes at the Gary Works in recent years.

b. WASTE DESCRIPTIONS

TABLE 1
PRODUCTION FACILITIES SHUT DOWN AFTER 1980

Rail Mill
Billet Mill
44" Blooming Mill
9" - #1 Bar Mill
10" - #2 Bar Mill
12" - #1 Bar Mill
14" - Bar Mill
18" - #1 Bar Mill
12" - #4 Bar Mill
20" - #1 Bar Mill
Tie Plate
18" - #2 Bar Mill
12" - #5 Bar Mill
#2 Sinter Plant
80" Hot Strip Mill
Foundry and Pattern Shop
Forge Shop
Stainless Operations
Hot Rolling Equipment
No. 10 Blast Furnace
Coke Chemical Distillation Plant
Primary Mills
76-inch Pickle Line

The wastes generated at the Facility are presented in three categories: hazardous wastes, nonhazardous solid wastes, and reclaimed/recycled materials. Wastewater treatment systems are also described.

Hazardous Wastes

Hazardous wastes generated at the Facility were listed in the RCRA Part B permit application. Subsequently, some wastes have been delisted or determined to be nonhazardous. Some wastes are no longer generated due to process areas being shut down or changes in production processes. During the 1994 site visit, additional hazardous waste streams were identified. Table 2 lists the major hazardous wastes that have been generated by the Facility, the respective waste code and current and past management practices.

The primary hazardous wastes which were or are currently generated at the Facility are waste pickle liquor (K062), waste chromium sludge, tar decanter sludge (K087), roll shop swarf (D007). Waste Pickle Liquor (K062) is generated during the surface cleaning and preparation of steel and steel alloy products by immersion in dilute (2-8%) inorganic acid solutions (primarily hydrochloric acid solutions). Pickling is the process of chemically removing oxide and scale by the action of the acid solutions. Acid replenishment and pickling solution blowdown are necessary to control acid concentration and iron salts buildup in the bath, respectively.

TABLE 2
HAZARDOUS WASTE GENERATION AND DISPOSAL/TREATMENT
USS-GARY WORKS

WASTE DESCRIPTION	1993 PRODUCTION	CURRENT STATUS OR DISPOSAL/TREATMENT SITE	PAST DISPOSAL/ TREATMENT SITE
Waste Pickle Liquor	More than 17 million gallons	Recycled on site by PVS and used at Terminal Treatment Plant (TTP)	East Waste Acid Pit (HWT-2); Waste Acid Treatment Plant (HWT-1); TTP
Wastewater treatment sludges from chromium electroplating	1,655 tons	Heritage Environmental Inc. Indianapolis, IN.	HWT-2, HWD-5, and area surrounding HWD-5
Tar decanter sludge	1,400 tons	Recycled on-site	Disposed of at HWD-2
Roll shop swarf`	>1,000 cubic yds estimated	Heritage Environmental Inc. Indianapolis, IN.	On-site refuse landfill until mid-1994
Wastewater containing flushing liquor bleed off and coke oven gas condensate	consume 890,000 gpd	Used for quenching hot coke just after pushing	
Tar storage tank residues from tank clean-outs	Unknown	Recycled on-site coke oven feedstock	East and west pitch bays
Waste petroleum naphtha	Unknown	Safety-Kleen recyclers	
Metallurgical Laboratory waste acid	Unknown	Stored in tank	Since 1987, the waste has been stored in a tank

Although the composition of waste pickle liquor (WPL) may vary considerably depending on the particular application, it normally contains large quantities of ferrous iron, the respective salt (e.g., ferrous chloride), and free acids. Typically, free acid makes up from 0.5 to 8 percent of WPL. The bulk of the remainder is water and possibly some oils and grease. WPL is listed as a hazardous waste because of the potential for it to contain chromium and lead. Since 1974, the WPL has been recycled on-site by PVS Technologies, Inc. (formerly K.A. Steel) into a ferric chloride product or used as a treatment chemical at the Terminal Treatment Plant (described in the Wastewater Treatment Facilities section). More than 17 million gallons of WPL was generated by the Facility in 1993.

Chromium solutions are used in the surface plating of galvanized, tin-free, and tin-plate steels to increase durability and facilitate application and adherence of paints and enamels. The surface coatings typically are applied either by immersion or electro-chemical processing (chromating) in chrome-containing solutions.

Waste solutions from the No. 1 Tin Free Steel Line and Nos. 5 and 6 Electro-tinning Lines are piped directly to the Chrome Treatment Plant (CTP) for chrome reduction treatment. Additionally, chrome-containing wastewater from the Nos. 6 and 8 Galvanizing Lines are periodically trucked to the CTP for treatment. Until September 1992, WPL was added to the chromium wastes to provide ferrous iron for reduction of hexavalent chrome to the trivalent form. Currently, sulfuric acid and sodium bisulfite are used in lieu of WPL. CTP effluent is directed to the Terminal Treatment Plant (TTP) where trivalent chrome is precipitated as a metal hydroxide through pH adjustment by lime addition. Approximately 1,655 tons of dewatered sludge was generated in 1993.

Tar decanter sludge, a RCRA-listed hazardous waste (K087) generated at the Coke Plant, is processed on-site by contractor, then mixed with coal being fed to the coke batteries. Portable 300-gallon bins of the sludge are brought from the tar decanters and pre-decanters to the reactor tank where the sludge is mixed with a diluent (a tar distillate that is primarily naphthalene) and mechanically liquified. In addition to tar decanter sludge, a contractor also reclaims tar tank sludge bottoms generated in the cleaning of tar tanks (K142) and occasional tar-contaminated spill material. About 1400 tons of sludge were processed in 1993.

Hazardous waste swarf (grindings) is produced by each of the six roll shops at the facility. These wastes are produced from refinishing the mill stand rollers, many of which are either chrome plated or fabricated from high-chrome steels. About 105,000 rolls were refinished by the shops in 1993. The total amount of swarf produced was not available from the company, however, the shop serving the South Sheet Mill complex refinished 5,200 rolls in 1993 and produced an estimated 50 cubic yards of swarf. The shop serving the hot strip mill refinished 43,000 rolls in 1993 and produced an estimated 600 cubic yards of swarf. The swarf was disposed of in the on-site refuse landfill operated by a contractor until about mid-1994.

Hot coke from the batteries is quenched with a mixture of flushing liquor bleed-off (about 400,000 gpd), coke oven gas condensate (about 15,000 gpd), various other coke plant process wastewaters, and service water (Lake Michigan water). The mixture may be a characteristic hazardous waste due to the benzene content.

Dewatered/stabilized Electric Arc Furnace (EAF) Sludge (KO61) was brought to the Facility from the now closed United States Steel-South Works (USS-South Works) facility in Illinois. This waste stream represented more than 85% of the total hazardous wastes managed at the HWD-5 Hazardous Waste Landfill. The sludge was generated in the Electric Furnace Shop at USS-South Works by the combined action of furnace vessel evacuation systems and overhead canopy hoods. Primary air emissions were cleaned by wet scrubbers. Secondary fugitive air emissions from the canopies were cleaned by wet scrubbers and a dry baghouse system.

Nonhazardous Solid Wastes

Solid wastes currently generated at the Facility include general industrial debris and rubbish (e.g., paper, wood, refractory debris, construction/demolition debris, tires, heavy equipment, empty containers, and scrap metal); gas-cleaning and wastewater treatment sludges such as BOP sludge, Q-BOP sludge, blast furnace recycle system basin sludge and TTP sludges; and a variety of dusts, scale and used/spent industrial chemicals (e.g., antifreeze, mineral spirits, cleaners, etc). Many of these wastes are industrial wastes which may contain hazardous constituents, but are not RCRA hazardous wastes. Examples of these wastes and estimated rates of generation are presented in Table 3.

TABLE 3
NONHAZARDOUS WASTES AND ESTIMATED GENERATION RATES*
USS-GARY WORKS

Description of Waste Stream	Estimated Maximum Generation Rate (Cubic Yards/Year)
#2 Q-BOP Thickener Underflow	110,600
General Debris and Refuse	105,500
TTP Sludge	60,000
#1 BOP Clarifier Underflow	29,000
#2 Q-BOP Clarifier Sludge	29,000
#1 BOP Clarifier Sludge	19,200
84" Filtration Plant Sludge	19,000
#2 Caster Scale	12,500
Sinter Screening Baghouse	8,500
#1 Caster Scale	6,200
API Separator No.6 Zinc Hydroxide Sludge	5,200
General Cleanup Materials and Brick/Ceramics	5,000
BF Recycle System Basin Sludge	3,600
Baghouse Dust Desulfurization System	1,300
ST-17 Final Oil Separator Sludge	1,100
Soaking Pit Bottoms	1,100
Slag	**

** Data not available

Some of the nonhazardous wastes may have been or may be currently placed in several areas within the plant. These areas include land adjacent to HWD-5, BOP Sludge Storage Area, Buchanan Basin, and Refuse Landfill. Prior to 1981, blast furnace flue dust sludge was deposited in the Mason Basins. The general area of HWD-5 has received slag fill and slag filling has occurred throughout the entire facility.

The wastes listed in Table 3, with the exception of slag and general refuse, are defined as "special wastes" in the State of Indiana. Special wastes include all industrial process wastes and wastes generated by operation of air, water and waste pollution control devices which are not regulated by the RCRA Subtitle C hazardous waste program.

Chemical analyses were conducted on lime-stabilized waste pickle liquor sludges from the TTP and ST-17 Final Oil Separator sludges to determine if the wastes exhibited the characteristics of Extraction Procedure (EP) Toxicity. Results of these tests were included in Part B of the Facility's Application for a RCRA permit and indicated EP toxicity levels were not exceeded in these wastes when tested by EP test methods; however, total dissolved metals analysis showed elevated levels of total chromium, lead and nickel. Terminal Treatment Plant (TTP) sludges are also reported to contain 50% to 75% moisture, up to 20% iron, and some oil. API Separator No. 6 zinc hydroxide sludge reportedly consists of 40% zinc mixed with lime.

Scale and slag are generated in large quantities during the steel production process. Slag is formed during the melting of the charge with the composition dependent upon the type of steel-making process. The major reported chemical components of slag are calcium silicates, lime-iron compounds and lesser amounts of free lime, zinc and magnesia. Scale is the oxidized surface which forms on the steel during heating for working and during hot working of steel. Principal components of scale are iron oxides: FeO, Fe_2O_3 and Fe_3O_4; and trace metals.

Reclaimed/Recycled Materials

Many by-products generated in the manufacturing processes at the Facility are reclaimed or recycled as feedstock at the Sinter Plant or sold to off-site customers. Table 4 lists examples of these reclaimed materials. Most of the reclaimed materials reportedly contain zinc, heavy metals and minor amounts of oil (i.e., $< 0.5\%$). Before 1980, the Facility routinely disposed of these wastes in land disposal units at the Facility.

TABLE 4
REVERT MATERIALS AND ESTIMATED GENERATION RATES*

Revert Description	Estimated Maximum Generation Rate (Cubic Yards/Year)
Coke Breeze	277,800
Pellet Fines	137,900
Mill Scale	105,200
#13 BF Sludge Filter Cake	54,100
BF Flue Dust	21,000
Finishing Mill/Lift Station Mill Scale	20,100
Mill Scale	7,400
Scarfing Scale	400
Sinter Fines	-
Sinter Storage Bin Baghouse Dust	-
Sinter Plant Precipitator Dust	-
Slag	-
- Data not available	-

Several potential waste streams generated at the Facility are recycled by subcontractors on-site. The wastes include used oil, metallics, paper and wood, waste pickle liquor (primarily spent HCl), tar decanter sludge, and slag. Some of these operations are described briefly below.

Waste Oil

Since 1983, waste oil generated by the Facility has been processed on-site by a contractor, Oil Technology, Inc., using two operations. One operation produces reclaimed oil that is reused in the mills; the other operation produces a fuel oil that is burned in the blast furnaces. Oil that is processed for reuse is generated from circulating lubricant tanks in the North Pickle Line, 6-stand Cold Reduction mill, North Sheet Mill, and the 84-inch Hot Strip Mill. Oil processed into blast furnace fuel is recovered at the Hot Strip Mill recycle system, Terminal Treatment Plant, ST-17 Final Oil Separator, North Sheet Mill oil separator, 160/210-inch Plate Mill scale pit and used oil from various other on-site sources (e.g., from maintenance and demolition activities). The waste oils are collected by vacuum trucks (operated by other contractors), or in drums and transported to the Oil Technology operation.

Oil reclaimed for lubrication of mill equipment is treated with a de-emulsifier then the water is decanted. Next, the oil is centrifuged for additional water removal, then filtered. More than 0.8 million gallons of lubricant were reclaimed by Oil Technology in 1993. Oil reclaimed as a blast furnace fuel is treated with a de-emulsifier, then decanted, if necessary. Next, excess moisture is removed by evaporation in steam-heated process tanks, then the oil is filtered. About 2.7 million gallons of blast furnace fuel was produced in 1993 by Oil Technology. Both processes together generated about 60 cubic yards of oily tank bottom sludge and spent filter media in 1993. This material is disposed of in an on-site landfill. Oil Technology also operated a drum cleaning/recycling operation on-site. Beginning in late 1994, the operation was contracted to Heritage Environmental Services.

Waste Pickle Liquor

Waste pickle liquor (spent hydrochloric acid) from the 84-inch, 80-inch and 66-inch pickle lines is gravity fed via underground piping to an on-site contractor, PVS Technologies, Inc. Similar material is also received in tank trucks and rail-car by PVS from off-site generators. The WPL is received in the PVS brick-lined below-grade holding basin. WPL from off-site generators can also be off-loaded to above-ground rubber-lined storage tanks. During processing, it is reacted with liquid chlorine and iron oxide to produce concentrated ferric chloride. The ferric chloride product is sold as a wastewater treatment chemical. Between 1962 and 1989, excess WPL was disposed of via deep well injection. Process wastewater is discharged to the Final Oil Separator, as discussed in the following

Wastewater Treatment Facilities section. Waste process solids are shipped off-site for disposal as a characteristic hazardous waste (D002).

Tar Decanter Sludge

Sludge from the tar pre-decanters and decanters is processed on-site by a contractor, as previously discussed, then mixed with coal used to charge the coke oven batteries.

Slag Reclamation

Slag generated by the steel-making and iron-making processes is processed by two subcontractors at the Facility; 1) International Mill Service, Inc. (IMS), and 2) Levy Inc. Steel-making slag is crushed by IMS and sorted by size. Iron-bearing materials are magnetically removed and used as feedstock in the blast furnaces and sinter plant.

The iron-making slag is processed by Levy Inc. by two different operations. Quenched slag from all blast furnaces is taken to an on-site processing area where it is first crushed. Iron-bearing materials are then magnetically separated for use in the blast furnace and sinter plant as feedstock. The slag residual is sold off-site. The marketable slag products, similar to quarry limestone rocks, are used as septic tank materials, railroad ballast and road bed materials. Blast furnace No. 13 is equipped with a slag granulator where water is sprayed on molten slag in the runner. This produces sand-size slag granules which is sold as product.

A third contractor, Fritz Enterprises, operates a slag mining operation in which slag fill is mined for metallics which can be used in the steel production process.

Wastewater Treatment Facilities

At least twelve wastewater treatment systems are currently operating at the Facility. The treatment units are designed for solids removal, metal hydroxide formation and precipitation, chrome reduction, oil separation, and/or acid neutralization. These wastewater treatment systems are listed in Table 5. The wastewater treatment systems are the source of many of the nonhazardous wastes that are either recycled, disposed of on-site, or discharged through several outfalls on the Grand Calumet River.

TABLE 5
ACTIVE WATER TREATMENT FACILITIES
USS-GARY WORKS

Name	Type of Treatment	Solids Disposition	Effluent Outfall
No. 13 Blast Furnace Scrubber Water Treatment System	Primary settling and sludge dewatering	Sinter plant	Returned to blast furnace recycle system
Blast Furnace Recycle System	Solids removal and cooling	Sinter Plant	Formerly discharged to Outfall 017, now returned to blast furnace gas and sinter plant emissions cleaning systems, and used for slag quench
Continuous Caster Scale Pits	Solids removal, oil separation, and cooling	Scale to sinter plant, oil to Oil Technology	Outfall 030 via Terminal Lagoons
No. 1 BOP Shop Gas Cleaning System	Solids removal and sludge dewatering	Sinter Plant	Outfall 030 via Terminal Lagoons
No. 2 Q-BOP Gas Cleaning System	Solids removal and sludge dewatering	Sinter Plant or on-site disposal	Outfall 030 via Terminal Lagoons
Terminal Lagoons Treatment System	Wastewater treatment/oil separation	On-site disposal	Outfalls 030 and 028
Terminal Treatment Plant	Oil separation, chemical precipitation, solids removal, sludge drying beds.	Terminal Treatment Plant Sludge Disposal Area (on-site landfill)	ST-17 Final Oil Separator, then outfall 034
ST-17 Final Oil Separator	Solids removal and oil separation	On-site disposal	Outfall 034
Chrome Treatment System	Chrome reduction, chemical precipitation, sludge dewatering	Off-site hazardous waste landfill	ST-17 Final Oil Separator, then outfall 034
84" Hot Strip Mill Water Recycle System	Primary settling/oil separation, sand filtration, cooling, and sludge thickening	Scale to Sinter Plant, oil to Oil Technology, and sludge to on-site disposal	ST-17 Final Oil Separator, then outfall 034
Plate Mill Scale Pit	Primary settling/oil separation	Scale to Sinter Plant; oil to Oil Technology	Outfall 030 via Terminal Lagoons
Oil/Water Separator near North Sheet Mill	Oil/Water separation for mixtures picked up by vacuum truck	Oil to Oil Technology	Terminal Treatment Plant

7. ENVIRONMENTAL SETTING

a. LAND USE

Land use in the area surrounding the Facility is primarily heavy industry and commercial industries, including a fossil-fuel steam electric power station (NIPSCO) and the Gary Municipal Airport located west of the facility. The nearest residential areas are approximately 9,000 feet south of the waste management units in the western portion of the facility, 2,600 feet south of the central portion of the facility, and approximately 4,000 feet east of the eastern portion of the facility.

There are three population centers within four miles of HWD-5 landfill; Gary, Indiana, Hammond, Indiana and East Chicago, Indiana. The population within four miles of HWD-5 landfill has been estimated at 170,000.

The facility is located on the southern shore of Lake Michigan. The headwaters of the Grand Calumet River are located near the eastern portion of the facility, with the river flowing past the site. A man-made pond, designated as the Coke Plant Dewatering Sump, is located immediately southwest of the headwaters. A storm water runoff pond is located within the plant boundaries, directly east of HWD-5.

b. GEOLOGY

The facility is located in the Calumet Lacustrine Plain physiographic province which extends across the northern quarter of Lake County and the northern tenth of Porter County. The area is part of the Northern Moraine and Lake Region which is characterized by a variety of glacial landforms. The Lake Michigan shoreline, located within the bed of ancient Lake Chicago (present-day Lake Michigan), is the lowest elevation in Lake County. The present shoreline of Lake Michigan developed 10,000 or 12,000 years ago with three relict shorelines capped by sand dunes, representing successively lower stages of glacial Lake Chicago. These eolian dune deposits are referred to as the Calumet Beach deposits.

The Lake County area is located on the Kankakee Arch bedrock formation which is a bedrock high, separating the Michigan Basin to the northeast from the Illinois Basin to the southwest. The average structural dip of the saddle-like bedrock deposit is 5 to 7 feet per mile.

Surface topography at the Facility ranges from the level of Lake Michigan to about 90 feet above the lake water level. Physical land and subsurface characteristics of the Facility have been greatly altered by industrial development.

Soils at the facility are classified as urban land, consisting of fill materials such as cinders, slag, and industrial trash. It is estimated that over 50% of the facility is constructed on urban land, with slag used as the primary fill material. The depth of slag fill varies from 5 to 65 feet throughout the facility.

Beneath the slag fill is the Calumet Lacustrine Plain composed of a layer of unconsolidated glacial lacustrine deposits of Quaternary Age ranging from 15 to 250 feet thick. The unconsolidated deposits consist of large expanses of sand, silt and clay, small areas of organic-rich lake and swamp deposits, fine gravel from glacial out-wash, and clay-rich till units. The sands are very porous, exhibiting a permeability of 10^{-3} to 10^{-5} cm/sec. The permeability of the underlying till is much lower, ranging from $10x^{-6}$ to $10x^{-8}$ cm/sec.

Beneath the glacial lacustrine layer, the region is underlain by Paleozoic and Precambrian bedrock composed of shale, limestone, sandstone, and dolomite. In the area of the Facility, the depth to bedrock ranges from 122 to 179 feet below grade.

The uppermost bedrock units include the Devonian Age Antrim Shale, and the Traverse and Detroit River Formation

Limestones. The Silurian dolomite and limestones, near the top of the bedrock column, include the Salina and Wabash Formations, the Louisville and Brassfield Limestones, and the Salamonie Dolomite.

c. <u>HYDROGEOLOGY</u>

The uppermost or water table aquifer underlying the Facility is the Calumet Aquifer composed of Quaternary eolian and water-laid fine sands known as the Calumet Beach Deposit. The unconfined aquifer extends from Lake Michigan across the northern quarter of Lake County and a lesser portion of northern Porter County. The Calumet Beach Deposit ranges in thickness from 5 to 75 feet with an average thickness of 20 feet. Portions of this deposit are exposed and visible at land surface. The water table ranges in position from the surface in low inter-dunal areas to 50 or even 90 feet below the surface in the higher dunes. It is generally less than 15 feet below the surface through most of the area. Below the aquifer is a low permeability clay till, with an average thickness of 50 feet. Rainfall and surface infiltration are the major recharge sources for the Calumet Aquifer. Recharge is affected by the precipitation rate and the permeability of overlying soils. Groundwater discharge locally occurs to Lake Michigan and the Grand Calumet River (GCR).

Site-specific groundwater data from well logs show that the thickness of the Calumet Aquifer system varies from 14 to 65 feet over the plant area, with the average thickness of the sand deposit being 31 feet.

RCRA interim status groundwater monitoring was initiated in 1981. Twenty-five monitoring wells were installed at the facility in the early to mid-1980s near the units originally designated as hazardous waste units, see Table 6. None of the original wells are presently used for monitoring. However, these wells are intended to serve in the groundwater compliance monitoring program proposed for the three RCRA-regulated units: Hazardous Waste Landfill (HWD-5), Tar Decanter Sludge Disposal Area (HWD-2), and Neutralized Acid Lagoons (HWT-2), as required by IDEM. The purpose of each well (upgradient and downgradient), well screen length, and sand thickness for each well are included in Table 6.

TABLE 6
INACTIVE MONITORING WELL SUMMARY
USS-GARY WORKS

Well/Purpose	Well Screen Length (Ft)	Sand Thickness (Ft)
HWD-2		
HWD-2-02/upgradient	36.0	48.5
HWD-2-04/upgradient	36.0	24.0
HWD-2-03/upgradient	36.0	59.0
HWD-2-01/downgradient	30.0	40.0
HWD-2-05/downgradient	22.0	66.0
HWD-2-07/downgradient	20.0	42.5
HWD-2-08/downgradient	35.0	43.0
HWD-2-09/downgradient	35.0	40.0
HWD-5		
HWD-5-01/upgradient	37.5	32.0
HWD-5-02/upgradient	34.5	21.0
HWT-2-10/upgradient	20.0	43.5
HWD-5-03/downgradient	45.0	34.0
HWD-5-04/downgradient	45.0	34.0
HWD-5-05/downgradient	20.0	16.0
HWT-2		
HWT-2-01/upgradient	37.5	47.5
HWT-2-10/upgradient	20.0	43.5
HWT-13-01/upgradient	36.0	22.0
HWT-14-02/upgradient	30.0	41.5
HWT-2-02/downgradient	45.0	30.2
HWT-2-03/downgradient	45.0	34.0
HWT-2-04/downgradient	45.0	34.0
HWT-2-05/downgradient	40.5	*
HWT-2-06/downgradient	36.0	20.0
HWT-2-07/downgradient	36.0	19.0
HWT-2-08/downgradient	20.0	15.0
HWT-2-09/downgradient	30.0	9.0

* Data not available.

The direction of groundwater flow at the Facility is generally northward toward Lake Michigan, and in the eastern portion of the facility groundwater flows locally towards the GCR and Lake Michigan. Lake Michigan is the principal source of water in the vicinity of the Facility, with groundwater usage for any purpose in the Lake County area generally restricted to communities south of the Calumet Lacustrine Plain. These communities have access to the Valparaiso and Kankakee Aquifer systems located in the southern three-quarters of the county.

In 1994, US Steel began the first phase of a "Plant-wide Groundwater Assessment" (PGA) which will characterize the plant-wide hydrogeologic setting. It includes the installation of 14 soil borings to be used as additional groundwater level monitoring wells and a data collection program including soil sampling and analysis and the collection of other geologic, hydrogeologic and hydrologic data, followed by the development of a groundwater flow model.

d. FLOOD PLAIN AND SURFACE WATER

Lake Michigan

The 100-year flood plain elevations for Lake Michigan as documented in Flood Insurance Rate Maps and prepared by the Federal Insurance Administration, indicate flooding from Lake Michigan is not a concern. However, damaging storm waves that occur during unusually high lake levels have eroded the shoreline at the Facility in spite of barriers constructed by the facility. The shoreline was observed to be eroded significantly in the western and central portions of the facility. With the exception of lake fill, no known solid waste management units are located in the area affected by the wave action.

Lake Michigan is a major source of public drinking water as well as water for industrial use. The lake is also used for recreation. Although the Facility reports that the area in the immediate vicinity is not used for swimming, public fishing has been allowed along the shore of Lake Michigan north of the western portion of the facility.

Grand Calumet River

The Grand Calumet River originates from two lagoons in the Indiana Dunes National Lakeshore and the eastern portion of the facility, the USX and Marquette Park Lagoons. These headwater lagoons have no measurable velocities, but a net flow to the west is detectable in the small channel connecting the two lagoons. The Grand Calumet River does not present a major flooding potential since the river is primarily composed of industrial cooling and process waters and waste treatment plant effluents. Water flows from the west side of the west lagoon through culverts under an access road to the open channel of the river. The river flows along the southern edge of facility property in a westerly direction.

Use of the river is primarily limited to industrial purposes; with no known utilization as potable water supply. The Facility is permitted to discharge to the river through 18 outfalls.

Storm Water Runoff Pond

The storm water runoff pond, also referred to as the Stockton Pond, receives storm water runoff from the area of the No. 1 EGL building and west parking lot. The pond is located 400 feet east of HWD-5 and south of the Marblehead Lime Dust Areas. The pond is not used as a source of industrial or potable water and is not used for recreational purposes.

RELEASE PATHWAYS

a. SOIL/GROUNDWATER: Permeable slag fill and urban soils exist over most of the facility, underlain by large expanses of sand deposits, silt and clay from the Calumet Lacustrine Plain. Contaminants could migrate laterally through these soils to Lake Michigan and the Grand Calumet River. The groundwater generally occurs in the glacial lacustrine layer at 5 to 50 feet below land surface and provides a primary route for contaminant migration from landfill leachate, surface spills, surface impoundment leakage, and leakage from sewers or above ground tanks.

The residential areas surrounding USS-Gary Works obtain their drinking water predominantly from public water supplies. Ground-water use for drinking water purposes is very limited, with no groundwater withdrawal wells known to exist downgradient of the site.

The Calumet aquifer is generally not used for water supply purposes; however, the aquifer discharges into the Grand Calumet River, which discharges into Lake Michigan. Most of the potable water used in the vicinity of the Calumet aquifer is obtained from Lake Michigan. The deeper bedrock aquifers are generally used for high capacity industrial purposes.

RCRA groundwater monitoring was initiated at the facility in 1981. The original monitoring system was designed and installed by a contractor, Engineering Science. Baker Engineering, Inc. (Baker), under contract to USS, has planned and implemented most of the groundwater monitoring activities at the facility from 1983 to 1993. Geraghty and Miller has been undertaking groundwater monitoring activities since 1993. Three hazardous waste management units are inactive but not RCRA closed, and continue to be monitored. The three units include HWD-2 (Tar Decanter Sludge Disposal Area), HWD-5 (Hazardous Waste Landfill), and HWT-2 (Neutralized Waste Acid Lagoons).

Site HWD-2 is located less than 200 feet north of the Grand Calumet River and in close proximity to the USX/Marquette Lagoon; and groundwater contaminants may migrate to the river and lagoons, where local groundwater discharge occurs. Groundwater flow from HWD-5 is toward Lake Michigan. Groundwater from HWT-2 flows radially away from the two surface impoundments until it meets the regional flow path. A reversed gradient occurs along the south side of the surface impoundments and flows a short distance southward from the impoundments, then turns and eventually flows northward toward Lake Michigan.

Statistical analyses of groundwater monitoring data, developed in the early 1980s from upgradient and downgradient monitoring wells, indicated that groundwater contamination had occurred at the three units. USX contracted Baker to conduct a detailed groundwater flow study because uncertainties existed with respect to upgradient and downgradient well placement. The report, completed in 1985, concluded that the wells were improperly placed, which rendered the statistical analyses invalid.

November 30, 1987, Indiana Department of Environmental Management (IDEM) issued an Administrative Order, citing inadequate characterization of the subsurface to identify potential contaminant pathways, improper well construction (mainly due to excessively long screens), and failure to conduct a groundwater quality assessment program. An Agreed Order, executed June 3, 1991, required workplans to be developed and implemented to replace the entire monitoring network and to conduct an accelerated RCRA first year groundwater quality program. The document "Work Plans For Hydrogeological Investigations, Well Replacements, and Accelerated Groundwater Quality Investigations at Gary Works Sites HWD-5, HWT-2, and HWD-2," was prepared by Baker in December 1989, updated in July 1991, and approved by IDEM.

Following the approved plan, an accelerated detection monitoring program was implemented. New well clusters were installed, see Table 7, each consisting of two wells: One shallow well screened near the water table surface in the sand/slag aquifer, and one deep well screened at the sand/clay till interface, with a 3 foot sump at the bottom for detection of any dense nonaqueous phase layer. The wells were constructed of polyvinyl chloride pipe, with 10 foot screens.

TABLE 7
ACTIVE RCRA GROUND-WATER MONITORING WELLS
USS-GARY WORKS

RCRA Waste Management Unit	Type of Groundwater Monitoring	Well Cluster Designation	Well Clusters in Monitoring Network
HWD-2	Detection Monitoring	Upgradient	HWD-2-16S, HWD-2-16D
		Downgradient	HWD-2-10S, HWD-2-10D HWD-2-11S, HWD-2-11D HWD-2-12S, HWD-2-12D HWD-2-15S, HWD-2-15D
	Assessment Monitoring	Downgradient	HWD-2-17S, HWD-2-17D HWD-2-18S, HWD-2-18D HWD-2-19S, HWD-2-19D HWD-2-20S, HWD-2-20D HWD-2-21S, HWD-2-21D HWD-2-22S, HWD-2-22D HWD-2-23S, HWD-2-23D HWD-2-24S, HWD-2-24D
HWD-5	Detection Monitoring	Upgradient	HWD-5-08S, HWD-5-08D
		Downgradient	HWD-5-06S, HWD-5-06D HWD-5-07S, HWD-5-07D HWD-5-09S, HWD-5-09D HWD-5-10S, HWD-5-10D
	Assessment Monitoring	Downgradient	HWD-5-10S, HWD-5-10D HWD-5-11S, HWD-5-11D HWD-5-12S, HWD-5-12D HWD-5-13S, HWD-5-13D
HWT-2	Detection Monitoring	Upgradient	HWT-2-11S, HWT-2-11D HWT-2-12S, HWT-2-12D
		Downgradient	HWT-2-13S, HWT-2-13D HWT-2-14S, HWT-2-14D HWT-2-16S, HWT-2-16D HWT-2-17S, HWT-2-17D
	Assessment Monitoring	Downgradient	HWT-2-18S, HWT-2-18D HWT-2-19S, HWT-2-19D HWT-2-20S, HWT-2-20D HWT-2-21S, HWT-2-21D HWT-2-22S, HWT-2-22D

The accelerated monitoring program included sampling and analysis of RCRA groundwater quality indicator parameters, Appendix IX, and Drinking Water Suitability parameters, and other miscellaneous or general (aesthetic) groundwater quality parameters. The 1992 accelerated monitoring program results, see Table 8, confirmed earlier statistical analysis results, indicated impacts to downgradient groundwater

TABLE 8
SUMMARY OF SIGNIFICANT 1992 GROUND-WATER MONITORING DATA
USS-GARY WORKS

Hazardous Waste Management Unit	Monitored Portion of Aquifer	Parameters Detected Above Upgradient Levels[1] Analytical Results from Downgradient Wells
HWD-2	Shallow	pH decrease, Lead above maximum contaminant level (MCL) for Primary Drinking Water Standards, di-n-butyl phthalate and kepone 9 other Appendix IX or drinking water suitability parameters
	Deep	Total Organic Carbon (TOC) and Total Organic Halogen (TOX), Cadmium, beryllium, and antimony above MCLs, di-n-butyl-phthalate 11 other Appendix IX Drinking Water Suitability dissolved metals or other parameters 8 nonhazardous, miscellaneous, or general (aesthetic) groundwater quality parameters
HWD-5	Shallow	pH increase, Specific Conductance (SC), TOC, and TOX, Beryllium and antimony exceeding MCLs, p-Cresol, 2,4-dimethylphenol, di-n-butyl phthalate, naphthalene, Phenanthrene, phenol, and acetone, Kepone, sulfide, and cobalt, 10 other nonhazardous, miscellaneous, or general water quality parameters
	Deep	pH increase, SC, TOC, and TOX, Antimony and arsenic exceeding MCLs, p-cresol, 2,4-dimethylphenol, di-n-butyl phthalate, and phenol, 7 other Appendix IX (mostly dissolved metals) or drinking water suitability parameters, Sulfide and cobalt
HWT-2	Shallow	pH increase, SC, and TOC, fluoride, cadmium, beryllium, and antimony exceeding MCLs, kepone and heptachlor, 11 Appendix IX and/or drinking water suitability parameters, 9 other nonhazardous, miscellaneous, or other general Groundwater quality parameters
	Deep	pH decrease, SC, TOC, TOX, fluoride, beryllium, and arsenic, Di-n-butyl phthalate, acetonitrile, and gamma-(BHC) (Lindane) 10 other Appendix IX or drinking water suitability parameters, 11 other nonhazardous, miscellaneous, and general water quality parameters

1 Analytical results reflect increases in of the parameter listed when compared to upgradient values, except in the case of pH, where decreases sometimes are an indicator of contaminant migration.

quality associated with these units. Due to the confirmation, and in accordance with RCRA and the approved work plans, USX was required to implement a Groundwater Quality Assessment Program (GQAP), to determine the rate, extent, and magnitude of groundwater contamination. The assessment program has included installation of new perimeter monitoring wells, see Table 7, downgradient from all three hazardous waste management units, as close to the potentially receiving surface water bodies as possible to determine the extent and nature of the contamination.

On March 31, 1993, IDEM issued a Commissioner's Order, citing poor hazardous waste management practices including non-permitted hazardous waste disposal of K087 in the Basic Oxygen Process (BOP) sludge disposal area. The Commissioner's Order required assessment and remediation of the K087 spills and closure of the BOP sludge disposal area. This matter was resolved on September 26, 1994, when IDEM issued an Agreed Order which required a Plant Wide Groundwater Assessment (PGA). The PGA called for plant-wide characterizations of hydrology, groundwater, and if necessary, interim measures for mitigation of adverse groundwater quality. The PGA provided that, upon issuance of a RCRA Corrective Action Order by U.S. EPA, remaining requirements under the PGA, as well as IDEM's right to seek additional assessment or remediation under the PGA, would be terminated.

Initial PGA work efforts were presented in the Phase I Report Plant-Wide Groundwater Assessment (PGA), US Steel Gary Works, dated February 1996, and submitted to IDEM. Based on the Phase I results, IDEM and US Steel agreed that supplemental hydrogeologic data collection and analysis would be performed under Phase IIA of the PGA. The scope of the Phase IIA PGA was to better understand:

1. Surface water/groundwater interactions and the impact of these interactions on the location of the groundwater divide between Lake Michigan and the Grand Calumet River; and,

2. The influence of select man-made structures, specifically, those structures that may have an influence on plant-wide groundwater flow.

Phase IIA activities were completed between August 1996 and November 1997. Ten supplemental monitoring wells and 11 staff gauges were installed as part of the Phase IIA monitoring network. Evaluation of groundwater and surface water data collected during Phase I and Phase IIA has resulted in a better understanding of groundwater and surface water interactions at the facility. The objective of the Phase IIA PGA was met as a result of this work.

The facility has extensive underground piping for Process Sewer Systems (e.g., gravity sewer for waste pickle liquor), and the integrity of these units is unknown. The potential for release of hazardous constituents from the units is high.

b. <u>SURFACE WATER</u>: Wastewater from the facility's treatment plants is recycled or discharged to the Grand Calumet River under an NPDES permit. Stormwater runoff is directed to wastewater treatment facilities, the Grand Calumet River, the Stockton Pond, and Lake Michigan. Therefore, there is a potential for discharge of contaminants in the runoff from the facility.

In addition, contaminated groundwater may reach surface water in the vicinity of the plant. Public water supply intakes are located in Lake Michigan within three miles of the facility. From the groundwater contour map, the general direction of groundwater flow in the upper aquifer appears to be northerly to Lake Michigan, with localized mounding and discharge to the Grand Calumet River, including the USX/Marquette Park lagoons. Groundwater containing hazardous constituents could reach Lake Michigan. Complete information about the release of hazardous constituents from the units is unknown. Groundwater containing hazardous constituents, flowing locally to the south, could discharge to the Grand Calumet river.

c. AIR: Releases to the air may occur at the facility from several process units (blast furnaces, coke plant batteries, and steel-making furnaces, etc.). The releases result from air emissions being vented directly to the atmosphere and are permitted by IDEM. Waste piles, such as the Marblehead Lime Dust Disposal Area have a high potential for particulate release from exposure to prevailing winds. Unregulated releases occur at several hazardous/solid waste management units which, at least include, the Tar Decanter Sludge Disposal Area, the Oil Technology Thermal Treatment Units, Coke Breeze Area, and the Refuse Landfill.

d. SUBSURFACE GAS: The facility has extensive underground piping for Process Sewer Systems (e.g., gravity sewer for WPL and other industrial wastes), and the integrity of these units is unknown. The potential for subsurface gas generation is high for these units as well as for sanitary sewers.

8. Releases of hazardous wastes and/or hazardous constituents and/or constituents listed 40 CFR 264 Appendix IX constituents have been detected in groundwater, soil, and/or sediments at the Facility as is described below.

a. Site HWD-2 is an unlined surface impoundment, previously used for disposal of tar decanter sludges (K087), tar tank clean-out sludges, tar spills, and blast furnace tar injection tank sludge spills. The tar decanter sludge also exhibited the characteristic of ignitability (EPA Hazardous Waste Number D001). Hazardous constituents in the wastes included cyanide, benzene, ethylbenzene, methylene chloride, toluene, xylene, acenapthalene, anthracene, phenol, benzo(a)anthracene, benzo(a)pyrene, 3,4-benzofluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, fluoroanthene, ideno(1,2,3cd)pyrene, naphthalene, phenanthrene, and pyrene. Hazardous wastes or hazardous constituents entering the groundwater from HWD-2 would migrate north toward Lake Michigan and south toward the Grand Calumet River. At a minimum, parameters detected in the groundwater at elevated concentrations downgradient with respect to upgradient include beryllium, cadmium, antimony, di-n-butyl phthalate, phenol, lead, arsenic, chromium, and nickel. Decreases in pH have also been detected downgradient. In addition, there are reports of naphthalene contamination in the sediments of the USX/Marquette Park Lagoon.

b. Site HWD-5 is an unlined landfill, previously used for disposal of Electric Arc Furnace air pollution emission control scrubber filter cake (K061), lime neutralized spent pickle liquor (SPL) sludge, SPL contaminated materials, caustic sludges (D002), terminal treatment plant sludges, cleaning tank sludges, and spent filter cartridges (all K062 materials). Hazardous constituents in the wastes included arsenic, cadmium, chromium, lead, nickel, selenium, silver, copper, and cyanide. Hazardous wastes or hazardous constituents entering the groundwater from HWD-5 would migrate north toward Lake Michigan. At a minimum, parameters detected in the groundwater at elevated levels downgradient with respect to upgradient include pH, specific conductivity, total organic carbon, total organic halogen, p-cresol, 2,4 dimethylphenol, di-n-butyl phthalate, naphthalene, phenanthrene, phenol, kepone, sulfide, cobalt, antimony, and arsenic.

c. Site HWT-2 consists of two unlined surface impoundments, previously used for disposal of lime neutralized SPL, terminal treatment plant floc-clarifier sludge, excess wastewater containing SPL, and other neutralized and un-neutralized waste acids. Hazardous waste disposed of in the lagoons included liquids with a pH less than 2, exhibiting the hazardous waste characteristic of corrosivity (EPA Hazardous Waste Number D002). Hazardous constituents in the waste included cadmium, chromium, lead, nickel, zinc, and phenol. Hazardous wastes or hazardous constituents entering the groundwater from HWT-2 would migrate north toward Lake Michigan. At a minimum, parameters detected in the groundwater at elevated levels downgradient with respect to upgradient include pH, specific conductivity, total organic carbon, arsenic, beryllium, cadmium, chromium, fluoride, lead, kepone, heptachlor, di-n-butyl phthalate, acetonitrile, gamma-(HCH) (Lindane), and phenol. Decreased pH has also been detected at deeper downgradient wells.

d. Elevated organic constituents, including benzene, toluene, acenaphthylene, anthracene, phenanthrene, phenol, 2,4-dinitrophenol, 2-methylphenol, and naphthalene, were detected in the groundwater in the Coke By-products plant. These hazardous wastes or hazardous constituents from the Coke By-product plant would potentially migrate toward the Grand Calumet River.

e. The unlined refuse landfill, located in the far eastern end of the Facility, is operated by a contractor. The landfill covers at least 20 acres and contains more than 97,000 cubic yards of material. The materials encompass a wide variety of wastes, including refractory brick, construction debris, scrap wood, garbage, slag fines, coke fines, coal tar pitch, drum and roll shop swarf. The latter includes hazardous wastes. Hazardous constituents present in the wastes would include, at a minimum, chromium, cadmium, lead, and cyanide. Hazardous wastes or hazardous constituents entering the groundwater from the refuse landfill would migrate either north toward Lake Michigan or south toward the Grand Calumet River.

9. Some of the hazardous wastes or hazardous constituents identified in groundwater and sediments at the Facility are listed as systemic toxicants and/or known or suspected carcinogens by the U.S. EPA, including lead, cadmium, chromium, antimony, arsenic, beryllium, zinc, nickel, cyanides, benzene, toluene, xylene, di-n-butyl phthalate, naphthalene, phenanthrene, phenol. These constituents may pose a threat to human health and the environment as described in the [Integrated Risk Information System (IRIS)] [Public Health Risk Evaluation Data Base (PHRED)].

10. The Facility presents a documented risk to human health and the environment. Releases from the Respondent's facility

have impacted the wetlands and surface water. Limited access from the GCR presents potential contact by the public with contaminated soils, sediments, and wetlands at and from the Facility.

11. U.S. EPA concludes that the potential exists for hazardous wastes or hazardous constituents to further migrate from the Facility into the environment via the following pathways: air, groundwater, and surface overland flow, and that the hazardous wastes or hazardous constituents may pose a threat to human health and the environment.

12. The Director, Waste, Pesticides and Toxics Division, U.S. EPA, Region 5, has determined that the actions ordered below are necessary to protect human health and the environment.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the foregoing findings of fact and after consideration of the Administrative Record, the Division Director of U.S. EPA Region 5, has made the following conclusions of law and determinations:

1. Respondent is a "person" within the meaning of Section 1004(15) of RCRA.

2. Respondent is the owner or operator of a Facility that has operated, is operating, should be, or should have been operating under interim status subject to §3005(e) of RCRA.

3. Certain wastes and constituents found at the Facility are hazardous wastes and/or hazardous constituents pursuant to §§1004(5), 3001 of RCRA; 40 CFR Part 261; and, Subpart S, §264.501, 55 Fed. Reg. 30874, July 27, 1990.

4. There is or has been a release of hazardous wastes or hazardous constituents into the environment from the Facility.

5. The actions required by this Order are necessary to protect human health and/or the environment.

VII. PROJECT COORDINATOR

1. Within thirty (30) days of the effective date of this Order, U.S. EPA and Respondent shall each designate a Project Coordinator and shall notify each other in writing of the Project Coordinator it has selected. Each Project Coordinator shall be responsible for overseeing the implementation of this Order and for designating a person to act in his/her absence. The U.S. EPA Project Coordinator will be U.S. EPA's designated representative for the Facility. To the maximum extent practicable, all

communications between Respondent and U.S. EPA, and all documents, reports, approvals, and other correspondence concerning the activities performed pursuant to this Order shall be directed through the Project Coordinator.

2. The parties may change their Project Coordinator but agree to provide at least thirty (30) days written notice prior to changing a Project Coordinator except in the case of an unexpected resignation in which case at least fourteen (14) days written notice shall be given.

3. The absence of the U.S. EPA Project Coordinator from the Facility shall not be cause for the cessation of work.

VIII. WORK TO BE PERFORMED

Pursuant to §3008(h) of RCRA, Respondent agrees to and is hereby ordered to perform the acts specified in this section, in the manner and by the dates specified herein. All work undertaken pursuant to this Order shall be performed in a manner consistent with, at a minimum: the attached Scopes of Work; all U.S. EPA-approved workplans or reports, including an ISM; the RFI Workplan and Report; the CMS Workplan and Report; the CMI Program Plan and Report; all other Workplans; RCRA and its implementing regulations; and applicable U.S. EPA guidance documents. Guidance may include, but is not limited to, documents listed in

Attachment VII to this Order, which are incorporated by reference as if fully set forth herein.

The parties acknowledge that the Facility is complex and diverse and occupies a large geographic area; in addition, major portions of the Facility include active manufacturing units. Accordingly, as set forth in Attachment II, Respondent may propose to divide the site into two or more SWMAs to be investigated in phases and/or may propose that certain portions of the Facility be evaluated on a Facility-wide basis, provided that all Work be performed in accordance with this Order and EPA-approved Workplans.

RCRA CORRECTIVE ACTION PLAN

A. Interim Stabilization Measures

1. Respondent shall implement the "Statement of Work: Grand Calumet River Sediment Remediation Plan" (SRP) in accordance with the terms of this Order. The SRP is attached hereto as Attachment I. The implementation of the SRP is contingent upon the Indiana Department of Environmental Management issuing a NPDES permit modification that will allow the discharge from the CAMU during the period that the dredging is being performed and sediments are being placed into the CAMU. In the event that USX is issued a permit that requires the installation of additional wastewater treatment

equipment beyond that specified in the SRP, or in the event a permit is not issued in time to allow the discharge from the CAMU to occur in accordance with the attached SOW and schedule, U.S. EPA agrees that dredging and other SRP activities directly related to, and dependent upon, the NPDES permit modification shall be deferred until a permit is issued and any permit appeals and variance requests relating to the need for the above referenced additional wastewater treatment equipment are resolved as a matter of law.

Respondent has submitted to U.S. EPA a Corrective Action Management Unit (CAMU) proposal, as defined in Federal Register, Volume 58, No. 29, pages 8658-8685, February 16, 1993. The CAMU proposal is subject to approval by U.S. EPA. Prior to implementation and in accordance with Section XXI of this Consent Order Respondent must receive all necessary permits or approvals. Implementation of the CAMU must be in a manner consistent with Attachment I to this Consent Order. The Sediment Remediation Plan and the CAMU proposal shall be carried out, at a minimum, in accordance with RCRA, its implementing regulations, and relevant U.S. EPA guidance documents and all other applicable laws and regulations.

U.S.EPA agrees that, upon complete and satisfactory performance of the Interim Stabilization Measure set forth in Attachment I, Respondent will have no further obligation under this Order with respect to remediation of sediments from the Grand Calumet River from the headwaters culvert to a point 500 feet upstream of the City of Gary Sanitary POTW Outfall 001 except that the foregoing does not apply to obligations for contamination which may occur subsequent to completion of the Interim Stabilization measure set forth in Attachment I.

2. In the event the Respondent identifies an imminent or potential threat to human health or the environment which requires an immediate response, the Respondent shall immediately notify U.S. EPA orally and in writing within fourteen (14) days after discovery of the threat, summarizing the immediacy and magnitude of the threat or potential threat to human health or the environment. Within thirty (30) days of notifying U.S. EPA, the Respondent shall submit to U.S. EPA an ISM Workplan in accordance with Attachment III, Section A for approval that identifies the individual stabilization measures which mitigate this threat and are consistent with and integrated into any long-term solution at the Facility.

Respondent shall implement the ISM in accordance with the terms of the Attachment III, and the approved ISM Workplan.

3. If U.S. EPA identifies an imminent or potential threat to human health and/or the environment, U.S. EPA will notify Respondent in writing. Within 30 days of receiving U.S. EPA's written notification, Respondent shall submit to U.S. EPA an ISM Workplan in accordance with the ISM Scope of Work, that identifies stabilization measures to mitigate the threat. If U.S. EPA determines that immediate action is required, the U.S. EPA Project Coordinator may orally require Respondent to act prior to Respondent's receipt of U.S. EPA's written notification.

B. RCRA Facility Investigation

1. Respondent shall conduct a RCRA Facility Investigation (RFI) in accordance with the RFI Scope of Work set forth in Attachment II including the schedules set forth in Attachment II. Respondent shall revise and submit to U.S. EPA all reports required by Task I of Attachment II within thirty (30) days of receipt of U.S. EPA's comments.

2. Within 180 days of U.S. EPA approval of Task I of the RFI, Respondent shall submit to U.S. EPA a workplan for a RCRA Facility Investigation (RFI Workplan) in accordance with Task II of Attachment II. The RFI Workplan shall include a schedule for completing Tasks III, IV, V, and VI of Attachment II. Hereafter, all work required in Task II-VII of Attachment II shall be referred to as the "RFI Workplan".

3. The RFI Workplan shall document the procedures and provide a specific schedule that the Respondent shall use to conduct those investigations necessary and appropriate to:

   a. Characterize the environmental setting;

   b. Characterize sources and nature of hazardous wastes and/or constituents;

   c. Identify and characterize any contaminant plumes (e.g., LNAPL, DNAPL, and dissolved);

   d. Characterize concentration, rate, and extent of contamination released at or from the facility;

   e. Describe and report any additional SWMUs or AOCs identified in the course of the RFI; and

   f. Collect data necessary to develop Protection Standards as presented in the RFI Scope of Work in Attachment II of Order.

   g. Delineate jurisdictional wetlands at the Facility which are or may be contaminated with hazardous waste or hazardous waste constituents.

4. EPA will coordinate the requirements of the ground-water and associated plume characterization with the Indiana Department of Environmental Management. The RFI Workplan shall address ground-water contamination through a plant-wide ground-water assessment plan that meets all the requirements presented in the RFI Scope of Work, Attachment II of the Order. The parties expect that the data collected by USX as part of a plant-wide groundwater assessment plan being conducted by USX pursuant to an administrative order with the Indiana Department of Environmental Management will be usable in developing the groundwater assessment plan required under Attachment II of this Order, provided that it meets EPA requirements for the Quality Assurance and Quality Control.

5. The RFI Workplan shall detail the methodology Respondent shall use to: (1) gather data needed to make decisions on stabilization during the early phase of the RFI; (2) identify and characterize all sources of contamination; (3) define the degree and extent of contamination; (4) characterize the potential pathways of contaminant migration; (5) identify actual or potential human and/or ecological receptors; and (6) support the development of alternatives from which a

corrective measure will be selected by U.S. EPA. A specific schedule for implementation of all activities shall be included in the RFI Workplan.

6. Attachment II contemplates that the RFI activities at the facility may proceed separately at one or more SWMAs. The RFI Workplan shall include a separate schedule for each SWMA.

7. U.S. EPA shall review the RFI Workplan and inform Respondent in writing of its approval or disapproval of the Workplan or any part thereof. In the event of disapproval, Respondent shall within sixty (60) days of receipt of notice of disapproval correct the submittal and resubmit it for U.S. EPA approval. Respondent may request an extension to this submittal correction period in writing no more than 45 days after the first disapproval. Such extension may be granted by U.S. EPA and the response will be given in writing. Subsequent to the re-submittal, U.S. EPA shall review the RFI Workplan and inform Respondent in writing of its approval, modification and approval or disapproval of the Workplan or any part thereof. A second disapproval subjects Respondent to stipulated penalties as described in Section XVI.1b below. Upon receipt of U.S. EPA approval or modification and approval of the RFI

Workplan, Respondent shall commence all work and activities in accordance with the approved schedules set forth in the RFI Workplan to commence and complete an RFI Report that accomplishes the objectives of this Order as set forth in Section VIII.B2 and the RFI Workplan. Respondent shall complete such work and activities in accordance with the approved schedules.

8. Respondent shall submit the RCRA SWMA Investigation Report for each SWMA to U.S. EPA in accordance with the schedule contained in the approved RFI Workplan. U.S. EPA shall review each RCRA SWMA Investigation Report in accordance with Section X of this Order and inform Respondent in writing of its approval or disapproval of the Report or any part thereof. In the event of disapproval, the Respondent shall correct the submittal and resubmit it for U.S. EPA approval within sixty (60) days of receipt of disapproval or such other time as specified in EPA disapproval notification. Respondent may request an extension to this submittal correction period in writing no more than 45 days after the first disapproval. Such extension may be granted by U.S. EPA and the response will be given in writing. Subsequent to the re-submittal, U.S. EPA shall review the final RCRA SWMA Investigation Report and inform Respondent in

writing of its approval, modification and approval, or disapproval of the report or any part thereof. A second disapproval subjects Respondent to stipulated penalties as described in Section XVI.1b below.

C. Corrective Measures Study

1. After U.S. EPA approval or modification and approval of the final RCRA SWMA Investigation Report for each SWMA, Respondent shall submit to U.S. EPA for review a Corrective Measures Study (CMS), if required by the approved RCRA SWMA Investigation Report, in accordance with the schedule set forth in the approved RCRA SWMA Investigation Report. The CMS shall be based on and consistent with the CMS Scope of Work contained in Attachment IV to the Order.

2. Respondent shall submit the Final Draft CMS Report to U.S. EPA for a SWMA in accordance with the schedule contained in the approved RCRA SWMA Investigation Report for any SWMA. U.S. EPA shall review the Final Draft CMS Report and inform Respondent in writing of its approval or disapproval of the Report or any part thereof. Subsequent to the first disapproval, Respondent shall have no more than sixty (60) days to correct the submittal and resubmit it for U.S. EPA approval.

Respondent may request an extension to this submittal correction period in writing no more than 45 days after the first disapproval. Such extension may be granted by U.S. EPA and the response will be given in writing. Subsequent to the re-submittal, U.S. EPA shall review the Final Draft CMS Report and inform Respondent in writing of its approval, modification and approval, or disapproval of the report or any part thereof. In the event that EPA requires Respondent to modify the Final Draft Report by recommending a corrective measures alternative not recommended in Respondent's Final Draft CMS Report, Respondent may initiate mediation pursuant to Section XVII. Para. 7. Such mediation must be requested in writing within 10 days from receipt of U.S. EPA's comments and will be limited to the issue of the selection of the corrective measures alternative. A second disapproval of the report subjects Respondent to stipulated penalties as described in Section XVI.1b below.

D. Corrective Measures Implementation (CMI)

1. Within ninety (90) days of Respondent's receipt of notification of U.S. EPA's selection of any corrective measure(s) to be undertaken at any SWMA, Respondent shall submit to U.S. EPA a Corrective Measures

Implementation Program Plan (CMI Program Plan for each SWMA). The CMI Program Plan is subject to approval by U.S. EPA in accordance with Section X: Agency Approvals/Proposed Contractor/Additional Work and shall be developed in a manner consistent with the CMI Scope of Work incorporated herein and contained in Attachment V.

2. The CMI Program Plan shall provide for the design, construction, operation, maintenance, and monitoring of corrective measures at the facility in accordance with Attachment V herein.

3. Concurrent with the submission of a CMI Program Plan, Respondent shall submit to U.S. EPA a CMI Health and Safety Plan in accordance with Attachment V.

4. U.S. EPA will review the CMI Program Plan and notify Respondent in writing of U.S. EPA's approval/ disapproval, or modification in accordance with Section X: Agency Approvals/Proposed Contractor/ Additional Work.

5. U.S. EPA shall review the CMI Program Plan and inform Respondent in writing of its approval or disapproval of the Workplan or any part thereof. In the event of disapproval, Respondent shall correct the submittal and

resubmit it for U.S. EPA approval within sixty (60) days of receipt of notice of disapproval. Respondent may request an extension to this submittal correction period in writing no more than 45 days after the first disapproval. Such extension may be granted by U.S. EPA and the response will be given in writing. Subsequent to the re-submittal, U.S. EPA shall review the CMI Program Plan and inform Respondent in writing of its approval, modification and approval or disapproval of the Workplan or any part thereof. A second disapproval subjects Respondent to stipulated penalties as described in Section XVI.1b below.

6. Upon receipt of U.S. EPA approval or modification and approval of the CMI Program Plan, Respondent shall commence all work and activities in accordance with the approved schedule set forth in the CMI Program Plan. Respondent shall complete such work and activities in accordance with such approved schedule.

7. Respondent shall submit a CMI Report for each SWMA to U.S. EPA in accordance with the U.S. EPA-approved CMI workplan schedule. U.S. EPA shall review the CMI Report for each SWMA in accordance with Section X of this Order and inform Respondent in writing of its approval or disapproval of the CMI Report or any part thereof. In

the event of disapproval, Respondent shall correct the submittal and resubmit it for U.S. EPA approval within sixty (60) days of receipt of notice of disapproval. Respondent may request an extension to this submittal correction period in writing no more than 45 days after the first disapproval. Such extension may be granted by U.S. EPA and the response will be given in writing. Subsequent to the re-submittal, U.S. EPA shall review the CMI Report and inform Respondent in writing of its approval, modification and approval or disapproval of the CMI or any part thereof. A second disapproval subjects Respondent to stipulated penalties as described in Section XVI.1b below.

E. Response to Comments

Any failure by Respondent to revise, in accordance with U.S. EPA comments, any workplans, reports, or other submittals to U.S. EPA required by this Section shall constitute a violation of this Order for which Respondent may be subject to stipulated penalties in accordance with Section XVI (Stipulated Penalties) of this Order. If any plan, report, or other submittal required to be submitted to U.S. EPA for approval pursuant to this Section is not approved by U.S. EPA upon its second submission (i.e., after U.S. EPA has made its first set of comments), or fails to address the tasks required in the approved workplan according to the schedule, then the submission shall be deemed inadequate and a violation of this Order, and Respondent may be subject to stipulated penalties in accordance with Section XVI (Stipulated Penalties) of this Order. The Parties retain their rights to invoke Section XVII (Dispute Resolution) consistent with the submittal/ approval process in this Section. Such stipulated penalties shall begin to accrue upon Respondent's failure to submit the required document within the time allotted for such submittal, or in the case where Respondent resubmits a document after U.S. EPA has made its first set of comments, upon Respondent's receipt of U.S. EPA's notice of second disapproval or request for further revision. Such stipulated penalties shall terminate on the date Respondent submits a document which fully complies with U.S. EPA's written comments.

IX. PUBLIC PARTICIPATION AND COMMENT IN CORRECTIVE MEASURE(S) SELECTION

1. U.S. EPA will provide the public with an opportunity to review and comment on the Final Draft of the Corrective Measures Study Report and a description of U.S. EPA's proposed corrective measure(s), including U.S. EPA's

justification for proposing such corrective measure(s) (the "Statement of Basis").

2. Following the public comment period, U.S. EPA may approve the Corrective Measures Study Report and select a final corrective measure(s) or require Respondent to revise the Report and/or perform additional corrective measures studies.

3. U.S. EPA will notify Respondent of the final corrective measure selected by U.S. EPA in the Final Decision and Response to Comments (RTC). The notification will include U.S. EPA's reasons for selecting the corrective measure.

X. AGENCY APPROVALS/PROPOSED CONTRACTOR/ADDITIONAL WORK

A. U.S. EPA Approvals

1. Subsequent to submittal by Respondent of workplans and major reports required under this Order, Respondent may request a meeting with EPA's Project Coordinator to discuss the submittal and answer any questions which the Project Coordinator may have prior to issuance of formal comments. To the extent permitted by available resources, EPA's Project Coordinator will make reasonable efforts to comply with a request for such a meeting. U.S. EPA will provide Respondent with its written approval, approval with

conditions and/or modifications, disapproval, or disapproval with comments, for any workplan, report (except progress reports), specification, or schedule submitted pursuant to or required by this Order. U.S. EPA will provide a statement of reasons for any approval with conditions and/or modifications, disapproval or disapproval with comments.

2. Respondent shall revise any workplan, report, specification, or schedule in accordance with U.S. EPA's written comments. Respondent shall submit to U.S. EPA any revised submittals in accordance with the due date specified by U.S. EPA. Revised submittals are subject to U.S. EPA approval, approval with conditions and/or modifications, disapproval, or disapproval with comments.

3. Upon receipt of U.S. EPA's written approval, Respondent shall commence work and implement any approved workplan in accordance with the schedule and provisions contained therein.

4. Any U.S. EPA-approved report, workplan, specification, or schedule shall be deemed incorporated into this Order. Prior to this written approval, no workplan, report, specification, or schedule shall be construed as approved and final. Oral advice, suggestions, or comments given by U.S. EPA representatives will not constitute an official

approval, nor shall any oral approval or oral assurance of approval be considered binding except that oral approval of minor matters involving field activities which are not covered by the provisions of an approved Workplan shall constitute approval provided they are confirmed in writing by Respondent within ten (10) days.

B. Proposed Contractor/Consultant

1. All work performed pursuant to this Order shall be under the direction and supervision of a professional engineer, hydrologist, geologist, or environmental scientist, with appropriate expertise in hazardous waste cleanup. Respondent's contractor or consultant shall have the technical expertise sufficient to adequately perform all aspects of the work for which it is responsible. Within 14 days of the effective date of this Order, Respondent shall notify the U.S. EPA Project Coordinator in writing of the name, title, and qualifications of the engineer, hydrologist, geologist, or environmental scientist and of any contractors or consultants and their personnel to be used in carrying out the terms of this Order. Respondent shall identify whether any contractor is on the List of Parties Excluded from Federal Procurement or Non-Procurement Programs. U.S. EPA reserves the right to disapprove

Respondent's contractor and/or consultant at any time during the period that this Order is effective. If U.S. EPA disapproves a contractor or consultant, then Respondent must, within forty-five (45) days of receipt from U.S. EPA of written notice of disapproval, notify U.S. EPA, in writing, of the name, title, and qualifications of any replacement. U.S. EPA's disapproval shall not be subject to review under Section XVII: Dispute Resolution.

C. Additional Work

1. U.S. EPA may determine or Respondent may propose that certain tasks, including investigatory work, engineering evaluation, or procedure/methodology modifications, are necessary in addition to the tasks included in any U.S. EPA-approved workplan, when such additional work is necessary to meet the purposes set forth in Attachments I, II, III, IV and V. If U.S. EPA determines that Respondent shall perform additional work, U.S. EPA will notify Respondent in writing and specify the basis for its determination that the additional work is necessary. Within thirty (30) days after the receipt of such determination, Respondent shall have the opportunity to meet or confer with U.S. EPA to discuss the additional work. If required by U.S. EPA, Respondent shall submit

for U.S. EPA approval a workplan for the additional work. U.S. EPA will specify the contents of such a workplan. Such a workplan shall be submitted within sixty (60) days of receipt of U.S. EPA's determination that additional work is necessary, or according to an alternative schedule established by U.S. EPA. Upon approval of a workplan by U.S. EPA, Respondent shall implement it in accordance with the schedule and provisions contained therein.

XI. QUALITY ASSURANCE

1. Respondent shall follow U.S. EPA guidance for sampling and analysis. A Quality Assurance Project Plan (QAPP) will be developed for all sampling and analysis conducted under this Order (see Attachment VI). Workplans shall contain quality assurance/quality control (QA/QC) and chain of custody procedures for all sampling, monitoring, and analytical activities. Any deviations from the QA/QC and chain of custody procedures in approved workplans must be approved by U.S. EPA prior to implementation; must be documented, including reasons for the deviations; and must be reported in the applicable report (e.g., RFI).

2. The name(s), addresses, and telephone numbers of the analytical laboratories Respondent proposes to use must be specified in the applicable workplan(s).

3. All workplans required under this Order shall include data quality objectives for each data collection activity to ensure that data of known and appropriate quality are obtained and that data are sufficient to support their intended use(s).

4. Respondent shall monitor to ensure that high quality data is obtained by its consultant or contract laboratories. Respondent shall ensure that laboratories used by Respondent for analysis perform such analysis according to the latest approved edition of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846 Third Edition as amended by Update III, June, 1997)," or other methods deemed satisfactory to U.S. EPA. If methods other than U.S. EPA methods are to be used, Respondent shall specify all such protocols in the applicable workplan (e.g., RFI). U.S. EPA may reject any data that does not meet the requirements of the approved workplan or U.S. EPA analytical methods and may require resampling and additional analysis.

5. Respondent shall ensure that laboratories it uses for analyses participate in a QA/QC program equivalent to that

which is followed by U.S. EPA. U.S. EPA may conduct a performance and QA/QC audit of the laboratories chosen by Respondent before, during, or after sample analyses. Upon request by U.S. EPA, Respondent shall have its laboratory perform analyses of samples provided by U.S. EPA to demonstrate laboratory performance. If the audit reveals deficiencies in a laboratory's performance or QA/QC, resampling and additional analysis may be required.

XII. SAMPLING AND DATA/DOCUMENT AVAILABILITY

1. Respondent shall submit to U.S. EPA upon request the results of all sampling and/or tests or other data generated by divisions, agents, consultants, or contractors pursuant to this Order.

2. Notwithstanding any other provisions of this Order, the United States retains all of its information gathering and inspection authorities and rights, including the right to bring enforcement actions related thereto, under RCRA, CERCLA, and any other applicable statutes or regulations.

3. Respondent shall notify U.S. EPA in writing at least fifteen (15) days prior to beginning each separate phase of field work approved under any workplan required by this Order. If Respondent believes it must commence emergency field activities without delay, Respondent may seek emergency

telephone authorization from the U.S. EPA Project Coordinator or, if the U.S. EPA Project Coordinator is unavailable, his/her Section Chief, to commence such activities immediately. At the request of U.S. EPA, Respondent shall provide or allow U.S. EPA or its authorized representative to take split or duplicate samples of all samples collected by Respondent pursuant to this Order. Similarly, at the request of Respondent, U.S. EPA shall allow Respondent or its authorized representative(s) to take split or duplicate samples of all samples collected by U.S. EPA under this Order.

4. Respondent may assert a business confidentiality claim covering all or part of any information submitted to U.S. EPA pursuant to this Order. Any assertion of confidentiality must be accompanied by information that satisfies the items listed in 40 C.F.R. §2.204(e)(4) or such claim shall be deemed waived. Information determined by U.S. EPA to be confidential shall be disclosed only to the extent permitted by 40 C.F.R. Part 2. If no such confidentiality claim accompanies the information when it is submitted to U.S. EPA, the information may be made available to the public by U.S. EPA without further notice to Respondent. Respondent agrees not to assert any

confidentiality claim with regard to any physical or analytical data submitted pursuant to this Order.

XIII. ACCESS

1. U.S. EPA, its contractors, employees, and/or any duly designated U.S. EPA representatives are authorized to enter and freely move about the Facility pursuant to this Order for the purposes of, inter alia: interviewing Facility personnel and contractors; inspecting records, operating logs, and contracts related to the facility; reviewing the progress of Respondent in carrying out the terms of this Order; conducting such tests, sampling, or monitoring as U.S. EPA deems necessary; using a camera, sound recording, or other documentary type equipment; and verifying the reports and data submitted to U.S. EPA by Respondent. Respondent agrees to provide U.S. EPA and its representatives access at all reasonable times to the Facility and subject to paragraph 2 below, to any other property to which access is required for implementation of this Order. Respondent shall permit such persons to inspect and copy all records, files, photographs, documents, including all sampling and monitoring data, that pertain to work undertaken pursuant to this Order and that are within the possession or under the control of Respondent or its contractors or consultants. While on Respondent's property

for the purpose of oversight of this Order, EPA will comply to the extent possible with the final Health and Safety Plan, submitted pursuant hereto which has been revised in accordance with any comments provided by U.S. EPA and has not been rejected by U.S. EPA, provided that nothing herein shall be construed as limiting any right of entry or access under any environmental law or regulation.

2. To the extent that work being performed pursuant to this Order must be done beyond the Facility property boundary, Respondent shall use its best efforts to obtain access agreements necessary to complete work required by this Order from the present owner(s) of such property within thirty (30) days of the date that the need for access becomes known to Respondent. Best efforts as used in this paragraph shall include, at a minimum, a certified letter from Respondent to the present owner(s) of such property requesting access agreement(s) to permit Respondent and its authorized representatives to access such property, and the payment of reasonable compensation in consideration of granting access. Any such access agreement shall provide for access by U.S. EPA and its representatives. Respondent shall insure that U.S. EPA's Project Coordinator has a copy of any access agreement(s). In the event that agreements for access are not obtained within thirty (30) days of approval of any

workplan for which access is required, or of the date that the need for access became known to Respondent, Respondent shall notify U.S. EPA in writing within fourteen (14) days thereafter of both the efforts undertaken to obtain access and the failure to obtain access agreements. U.S. EPA may, at its discretion, assist Respondent in obtaining access. In the event U.S. EPA obtains access, Respondent shall undertake U.S. EPA-approved work on such property.

3. The Respondent agrees to indemnify the United States as provided in Section XXII: Indemnification, for any and all claims arising from activities on such property.

4. Nothing in this section limits or otherwise affects U.S. EPA's right of access and entry pursuant to applicable law, including RCRA and CERCLA.

5. Nothing in this section shall be construed to limit or otherwise affect Respondent's liability and obligation to perform corrective action including corrective action beyond the facility boundary, notwithstanding the lack of access.

XIV. RECORD PRESERVATION

1. Respondent shall retain, during the pendency of this Order and for a minimum of 6 years after its termination, all data, records, and documents now in its possession or control or which come into its possession or control which

relate in any way to this Order or to hazardous waste management and/or disposal at the facility. Respondent shall notify U.S. EPA in writing 90 days prior to the destruction of any such records, and shall provide U.S. EPA with the opportunity to take possession of any such records. Such written notification shall reference the effective date, caption, and docket number of this Order and shall be addressed to the U.S. EPA Project Coordinator.

2. Respondent further agrees that within thirty (30) days of retaining or employing any agent, consultant, or contractor for the purpose of carrying out the terms of this Order, Respondent will enter into an agreement with any such agents, consultants, or contractors whereby such agents, consultants, and/or contractors will be required to provide Respondent a copy of all documents produced pursuant to this Order.

3. All documents pertaining to work performed pursuant to this Order shall be stored or made available by the Respondent in a centralized location at the Facility to afford ease of access by U.S. EPA or its representatives.

XV. REPORTING AND DOCUMENT CERTIFICATION

1. Beginning with the first full month following the effective date of this Order, and throughout the period that this Order is effective, Respondent shall provide U.S. EPA with Monthly Status and Quarterly Progress reports. Quarterly Progress reports are due the first full quarter after effective date of Order. Monthly Status reports are due on the first month of the first full quarter after effective date of Order. The Progress and Status reports shall conform to requirements in the relevant scope of work contained in Attachments I, II, III, and IV. U.S. EPA may adjust the frequency of progress reports to be consistent with site-specific activities.

2. Five (5) copies of all documents submitted pursuant to this Order shall be in writing and shall be hand delivered, sent by certified mail, return receipt requested, or by overnight express mail to:

Tamara T. Ohl
U.S. EPA, Region 5
RCRA Enforcement and
Compliance Assurance Branch, DRE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

3. Documents to be submitted to the Respondent should be sent to:

Richard L. Menozzi
U.S. Steel Group
USX Corporation
600 Grant Street
Pittsburgh, Pennsylvania 15219-2749

Other addresses can also be designated by the Project Coordinator. All documents submitted pursuant to this Order shall be printed on recycled paper and shall be copied double-sided whenever practicable.

4. Any report or other document submitted by Respondent pursuant to this Order which makes any representation concerning Respondent's compliance or noncompliance with any requirement of this Order shall be certified by a responsible corporate officer of Respondent or a duly authorized representative. A responsible corporate officer means: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation.

5. The certification required by paragraph three (3) above, shall be in the following form:

> "I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information

submitted. I certify that the information contained in or accompanying this submittal is true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature: ______________________
Name: ______________________
Title: ______________________
Date: ______________________

XVI. DELAY IN PERFORMANCE/STIPULATED PENALTIES

1. Unless there has been a written modification by U.S. EPA of a compliance date, a written modification by U.S. EPA of an approved workplan condition, or excusable delay as defined in Section XVIII: Force Majeure and Excusable Delay, if Respondent fails to comply with any term or condition set forth in this Order in the time or manner specified herein, Respondent shall pay stipulated penalties as set forth below upon written demand from U.S. EPA.

a. For failure to commence, perform, and/or complete field work in a manner acceptable to U.S. EPA or at the time required pursuant to this Order: $3,000 per day for the first seven days of such violation, $6,000 per day for the eighth through twenty-first day of such violation, and $12,000 per day for each day of such violation thereafter;

b. For failure to complete and submit any workplans or reports (other than progress reports) in a manner acceptable to U.S. EPA or at the time required pursuant to this Order, or for failure to notify U.S. EPA of imminent or potential threats to human health and/or the environment, new releases of hazardous waste and/or hazardous constituents and/or new solid waste management units not previously identified, as required by this Order: $3,000 per day for the first seven days of such violation, $6,000 per day for the eighth through twenty-first day of such violation, and $12,000 per day for each day of such violation thereafter;

c. For failure to complete and submit, other written submittals not included in paragraph b of this section in a manner acceptable to U.S. EPA or at the time required pursuant to this Order: $2,500 per day for the first seven days of such violation, $3,500 per day for the eighth through twenty-first day of such violation, and $5,000 per day for each day of such violation thereafter;

d. For failure to comply with any other provisions of this Order in a manner acceptable to U.S. EPA: $2,500 per day for the first seven days of such violation, $3,500 per day for the eighth through twenty-first day of such violation, and $5,000 per day for each day of such violation thereafter.

2. Penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the day of correction of the violation. Nothing herein shall prevent the simultaneous accrual of separate stipulated penalties for separate violations of this Order. Penalties shall continue to accrue regardless of whether U.S. EPA has notified the Respondent of a violation.

3. All penalties owed to the United States under this Section shall be due and payable within thirty (30) days of the Respondent's receipt from U.S. EPA of a written demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under Section XVII: Dispute Resolution. Such a written demand will describe the

violation and will indicate the amount of penalties due. EPA in its sole discretion, which is not reviewable or subject to the Dispute Resolution provisions of this Order, may waive stipulated penalties for good cause.

4. Interest shall begin to accrue on any unpaid stipulated penalty balance beginning on the thirty-first day after Respondent's receipt of U.S. EPA's demand letter. Interest shall accrue at the Current Value of Funds Rate established by the Secretary of the Treasury. Pursuant to 31 U.S.C. §3717, an additional penalty of 6% per annum on any unpaid principal shall be assessed for any stipulated penalty payment which is overdue for 90 or more days.

5. All penalties shall be made payable by certified or cashier's check to the United States of America and shall be remitted to:

U.S. EPA, Region 5
P.O. Box 70753
Chicago, Illinois 60673

All such checks shall reference the name of the Facility, the Respondent's name and address, and the U.S. EPA docket number of this action. Copies of all such checks and letters forwarding the checks shall be sent simultaneously to the U.S. EPA Project Coordinator.

6. Respondent may dispute U.S. EPA's assessment of stipulated penalties by invoking the dispute resolution procedures under Section XVII: Dispute Resolution. The stipulated penalties in dispute shall continue to accrue, but need not be paid, during the dispute-resolution period. Respondent shall pay stipulated penalties and interest, if any, in accordance with the dispute resolution decision and/or agreement. Respondent shall submit such payment to U.S. EPA within 7 days of receipt of such resolution in accordance with Paragraph 5 of this Section.

7. Neither the invocation of dispute resolution nor the payment of penalties shall alter in any way Respondent's obligation to comply with the terms and conditions of this Order.

8. The stipulated penalties set forth in this section do not preclude U.S. EPA from pursuing any other remedies or sanctions which may be available to U.S. EPA by reason of Respondent's failure to comply with any of the terms and conditions of this Order.

9. No payments under this section shall be tax deductible for Federal tax purposes.

XVII. DISPUTE RESOLUTION

1. The parties shall use their best efforts to informally and in good faith resolve all disputes or differences of opinion. The parties agree that the procedures contained in this section are the sole procedures for resolving disputes arising under this Order. If Respondent fails to follow any of the requirements contained in this section then it shall have waived its right to further consideration of the disputed issue.

2. If Respondent disagrees, in whole or in part, with any written determination or decision (Initial Written Decision) by U.S. EPA pursuant to this Order, Respondent's Project Coordinator shall notify the U.S. EPA Project Coordinator of the dispute. The Project Coordinators shall attempt to resolve the dispute informally.

3. If the Project Coordinators cannot resolve the dispute informally, Respondent may pursue the matter formally by placing its objections in writing. Respondent's written objections must be directed to the U.S. EPA Project Coordinator and may be copied to the RCRA Enforcement and Compliance Assurance Branch Chief. This written notice must be mailed to such person(s) within twenty-one (21) days of Respondent's receipt of the Initial Written Decision.

Respondent's written objection must set forth the specific points of the dispute, the position Respondent claims should be adopted as consistent with the requirements of this Order, the basis for Respondent's position, and any matters which it considers necessary for U.S. EPA's determination.

4. U.S. EPA and Respondent shall have fourteen (14) days from U.S. EPA's receipt of Respondent's written objections to attempt to resolve the dispute through formal negotiations. This time period may be extended by U.S. EPA for good cause. During such time period, (Negotiation Period) Respondent may request a conference with the RCRA Enforcement and Compliance Assurance Branch Chief to discuss the dispute and Respondent's objections. U.S. EPA agrees to confer in person or by telephone to resolve any such disagreement with the Respondent as long as Respondent's request for a conference will not extend the Negotiation Period.

5. If the parties are unable to reach an agreement within the Negotiation Period, the parties have the right to submit any additional written arguments and evidence, not previously submitted, to the decision maker within seven (7) days from the end of the Negotiation Period. Based on the record, U.S. EPA shall provide to Respondent its written decision on the dispute (U.S. EPA Dispute Decision) which shall include a response to Respondent's arguments and evidence. Such

decision shall be incorporated into and become an enforceable element of this Order, but will not be considered final Agency action for purposes of judicial review.

6. Except as provided in Section XVI: Delay in Performance/ Stipulated Penalties, the existence of a dispute as defined in this section and U.S. EPA's consideration of matters placed into dispute shall not excuse, toll, or suspend any compliance obligation or deadline required pursuant to this Order during the pendency of the dispute resolution process.

7. When authorized by the provisions of Section VIII.C.2, Respondent may initiate mediation within twenty (20) days of receipt of U.S. EPA's written comments on the Final Draft CMS Report for any SWMA unless otherwise resolved informally by this time. In the event of such a request, the parties agree to follow the procedures in paragraphs 8 through 14 below.

8. The parties agree that they will share equitably the costs of mediation. The U.S. EPA Project Coordinator shall notify Respondent as to the extent of U.S. EPA Region 5's ability to share equitably the costs of mediation within five (5) days of U.S. EPA's receipt of Respondent's request for mediation. This time period may be extended by the U.S. EPA

Project Coordinator if necessary to determine the availability of U.S. EPA Headquarters' funds to share the costs of mediation. U.S. EPA's ability to share the costs of mediation will be determined by U.S. EPA in its sole discretion and shall not be subject to dispute resolution or judicial review. Upon written notice by the U.S. EPA Project Coordinator to Respondent that U.S. EPA cannot equitably share the costs of mediation, Respondent may initiate the dispute procedures set forth in paragraphs 2 through 6 of this Section and the resolution of the dispute shall be governed by those procedures. If U.S. EPA notifies Respondent that it can equitably share the expenses of mediation then the Parties shall follow the procedures below.

9. If the parties use U.S. EPA's Dispute Resolution Support Services contract they agree to select a mediator(s) in accordance with the following procedures:

(a) Upon receipt of Respondent's request for mediation, and following U.S. EPA's notification that it can share the expenses of mediation, the parties will be forwarded a list of mediators ("Mediator Selection List") available through the Dispute Resolution Support Services Contract managed by U.S. EPA.

(b) Within five (5) days of Respondent's receipt of the Mediator Selection List, the parties shall simultaneously provide each other with a letter ("Mediator Nomination Letter") which shall contain the names of 5 persons from the Mediator Selection List nominated to serve as mediators for the Mediated Matter in dispute.

(c) The mediators nominated by each party must not have any past, present, or planned future business relationships with the parties, other than for mediation activities. They must also agree to the terms and conditions for mediation contained in this Consent Order and enter into an agreement for the provision of ADR services with the parties. All persons nominated shall be provided with a copy of the Consent Order by the nominating party. Any conflicts of interest or refusal to comply with the requirements of this section shall automatically result in rejection of said nominee.

(d) Within five (5) days of the receipt of the Mediation Nomination Letters, each party shall advise the other in writing of acceptable nominees. All acceptable nominees who are not automatically rejected pursuant to subparagraph (c) above, shall comprise the Mediator Nomination List. The parties shall select a mediator from the Mediator Nomination List and enter into an agreement for mediation services with such mediator through negotiation and by mutual consent within 20 days of the receipt of the Mediation Nomination Letters.

Alternatively, the parties may select a mediator from any other source of mediators. In this event, the provisions of paragraph 9(c) shall continue in effect.

10. The parties agree that the time period for mediation of the matter in dispute is limited to thirty (30) days from the date the parties sign an agreement with a Mediator. This time period may be extended by U.S. EPA.

11. If for any reason the parties are unable to select a mediator, or are unable to approve and execute an agreement for mediation services, or are unable to complete mediation and come to a resolution of the dispute, within the time periods for those activities specified in paragraphs 9 and 10 above, Respondent may initiate in writing, within ten (10) days of the end of the period specified in paragraphs 9 and 10, the dispute procedures set forth in paragraphs 2 through 6 of this Section and the resolution of the dispute shall be governed by those procedures.

12. Unless the parties agree otherwise in writing, the mediator's role shall be limited to facilitating negotiation between the parties. Mediation sessions shall not be

recorded verbatim and no formal minutes or transcripts shall be maintained. Unless the parties agree otherwise, the mediator shall make no written findings or recommendations.

13. Meetings or conferences with the mediator shall be treated as confidential settlement negotiations. Statements made by any person during any such meetings or conferences shall be deemed to have been made in compromise negotiations within the meaning of Rule 408 of the Federal Rules of Evidence and applicable state rules of evidence, and shall not be offered in evidence in any proceeding by any person. The mediator will be disqualified as a witness, consultant or expert in any pending or future action relating to the subject matter of the mediation, including those between persons not a party to the mediation. If Respondent fails to comply with the mediation confidentiality requirements of this section, then it will forfeit its rights, if any remain, under this Consent Order to request future mediation and may be responsible for stipulated penalties for such breach as provided in Section XVI.: Delay in Performance/Stipulated Penalties, Paragraph 1.d.

14. Any agreement to resolve the dispute reached by the parties pursuant to this section shall be in writing and shall be signed by both parties. The written agreement shall specify which provisions of the EPA Dispute Decision are superseded

and/or modified. If the written agreement is not signed by Respondent within seven (7) days after the resolution of the dispute it shall be null and void and the EPA Dispute Decision shall be incorporated into and become an enforceable element of this Order, but will not be considered final Agency action for purposes of judicial review.

XVIII. FORCE MAJEURE AND EXCUSABLE DELAY

1. Force majeure, for purposes of this Order, is defined as any event arising from causes not foreseen and beyond the control of Respondent or any person or entity controlled by Respondent, including but not limited to Respondent's contractors, that delays or prevents the timely performance of any obligation under this Order despite Respondent's best efforts to fulfill such obligation. The requirement that Respondent exercise "best efforts to fulfill such obligation" shall include, but not be limited to, best efforts to anticipate any potential force majeure event and address it before, during, and after its occurrence, such that any delay or prevention of performance is minimized to the greatest extent possible. Force majeure does not include increased costs of the work to be performed under this Order or financial inability to complete the work. Force majeure shall include labor disputes beyond the

control of Respondent and the failure to obtain necessary permits provided that Respondent has made a timely application for such permit and supplied in a timely manner any information required for such permitting.

2. If any event occurs or has occurred that may delay the performance of any obligation under this Order, whether or not caused by a force majeure event, Respondent shall contact by telephone and communicate orally with U.S. EPA's Project Coordinator or, in his or her absence, the Chief of the MN/OH Section of the Enforcement and Compliance Assurance Branch or, in the event both of U.S. EPA's designated representatives are unavailable, the Chief of the Enforcement and Compliance Assurance Branch, U.S. EPA Region 5, within forty-eight (48) hours of when Respondent first knew or should have known that the event might cause a delay. If Respondent wishes to claim a force majeure event, then within five (5) days thereafter, Respondent shall provide to U.S. EPA in writing the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; all other obligations affected by the event, and what measures, if any, taken or to be taken to minimize the effect of the event on those obligations; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay;

Respondent's rationale for attributing such delay to a force majeure event if it intends to assert such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health or the environment. Respondent shall include with any notice all available documentation supporting its claim, if any, that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Respondent from asserting any claim of force majeure for that event. Respondent shall be deemed to have notice of any circumstances of which its contractors had or should have had notice.

3. If U.S. EPA determines that the delay or anticipated delay is attributable to a force majeure event, the time for performance of such obligation under this Order that is affected by the force majeure event will be extended by U.S. EPA for such time as U.S. EPA determines is necessary to complete such obligation. An extension of the time for performance of such obligation affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation, unless Respondent can demonstrate that more than one obligation was affected by the force majeure event. If U.S. EPA determines that the delay or anticipated delay has been or will be caused by a force

majeure event, U.S. EPA will notify Respondent in writing of the length of the extension, if any, for performance of such obligations affected by the force majeure event.

4. If U.S. EPA disagrees with Respondent's assertion of a force majeure event, U.S. EPA will notify Respondent in writing and Respondent may elect to invoke the dispute resolution provision, and shall follow the time frames set forth in Section XVII: Dispute Resolution. In any such proceeding, Respondent shall have the burden of demonstrating by a preponderance of evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Respondent complied with the requirements of this Section. If Respondent satisfies this burden, the time for performance of such obligation will be extended by U.S. EPA for such time as is necessary to complete such obligation.

XIX. RESERVATION OF RIGHTS

1. U.S. EPA reserves all of its statutory and regulatory powers, authorities, rights, and remedies, both legal and equitable, which may pertain to Respondent's failure to

comply with any of the requirements of this Order, including without limitation the assessment of penalties under §3008(h)(2) of RCRA, 42 U.S.C. §6928(h)(2). This Order shall not be construed as a covenant not to sue, release, waiver, or limitation of any rights, remedies, powers, and/or authorities, civil or criminal, which U.S. EPA has under RCRA, CERCLA, or any other statutory, regulatory, or common law authority of the United States.

2. U.S. EPA reserves the right to disapprove of work performed by Respondent pursuant to this Order which is not in accordance with the terms and conditions hereof and to order that Respondent perform additional tasks. Any such disapproval shall be subject to the Dispute Resolution provisions of this Order.

3. U.S. EPA reserves the right to order or perform any portion of the work consented to herein as it deems necessary to protect human health and/or the environment provided that Respondent is not adequately performing the Work in accordance with the terms hereof. In addition, U.S. EPA reserves the right to order or perform any additional site characterization, feasibility study, and remedial work as it deems necessary to protect human health and/or the environment. U.S. EPA may exercise its authority under CERCLA to undertake response actions at any time. In any

event, U.S. EPA reserves its right to seek reimbursement from Respondent for costs incurred by the United States. Notwithstanding compliance with the terms of this Order, Respondent is not released from liability, if any, for the costs of any response actions taken or authorized by U.S. EPA.

4. If U.S. EPA determines that activities in compliance or noncompliance with this Order have caused or may cause a release of hazardous waste or hazardous constituent(s), or a threat to human health and/or the environment, or that Respondent is not capable of undertaking any of the work ordered, U.S. EPA may order Respondent to stop further implementation of this Order for such period of time as U.S. EPA determines may be needed to abate any such release or threat and/or to undertake any action which U.S. EPA determines is necessary to abate such release or threat.

5. This Order is not intended to be nor shall it be construed to be a permit. Further, the parties acknowledge and agree that U.S. EPA's approval of a corrective measure does not constitute a warranty or representation that it will achieve the required cleanup or performance standards. Compliance by Respondent with the terms of this Order shall not relieve Respondent of its obligations to comply with RCRA or any

other applicable local, State, or Federal laws and regulations.

6. Notwithstanding any other provision of this Order, no action or decision by U.S. EPA pursuant to this Order, including without limitation, decisions of the Regional Administrator, the Director of the Waste, Pesticides and Toxics Division, or any authorized representative of U.S. EPA, shall constitute final agency action giving rise to any right of judicial review prior to U.S. EPA's initiation of a judicial action to enforce this Order, including an action for penalties or an action to compel Respondent's compliance with the terms and conditions of this Order.

7. In any action brought by U.S. EPA for a violation of this Order, Respondent shall bear the burden of proving that U.S. EPA's actions were arbitrary and capricious and not in accordance with law.

8. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive or other appropriate relief relating to the facility, Respondent shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims

raised by the United States in the subsequent proceeding were or should have been raised in the present matter.

9. Respondent does not admit to the validity of, or take responsibility for, any factual or legal conclusions or determinations stated herein and does not admit to any violations or liability under any federal, state or common laws of any kind except that Respondent agrees that this Order shall be admissible as evidence in a proceeding brought by U.S.EPA to enforce this Order. This Order shall not be construed as an admission on the part of Respondent, in whole or in part, in any other administrative proceeding. Respondent reserves all of its defenses, rights and remedies, both legal and equitable, in response to any U.S. EPA contention that Respondent has failed to comply with any of the requirements of this Order. However, Respondent will not challenge the underlying validity of this Order or U.S. EPA's jurisdiction to enter it.

XX. OTHER CLAIMS

Nothing in this Order shall constitute or be construed as a release from any claim, cause of action, demand, or defense in law or equity, against any person, firm, partnership, or corporation for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous constituents, hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken or migrating from the Facility. The Respondent waives any claims or demands for compensation or payment under §§106(b), 111, and 112 of CERCLA against the United States or the Hazardous Substance Superfund established by 26 U.S.C. §9507 for, or arising out of, any activity performed or expense incurred pursuant to this Order. Additionally, this Order does not constitute any decision on preauthorization of funds under §111(a)(2) of CERCLA.

XXI. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to this Order shall be undertaken in accordance with the requirements of all applicable local, state, and Federal laws and regulations. Respondent shall obtain or cause its representatives to obtain all permits and approvals necessary under such laws and regulations.

XXII. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT

Respondent agrees to indemnify and save and hold harmless the United States Government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of Respondent or its officers, employees, agents, independent contractors, receivers, trustees, and assigns in carrying out activities required by this

Order. This indemnification shall not be construed in any way as affecting or limiting the rights or obligations of Respondent or the United States under their various contracts.

XXIII. MODIFICATION

1. This Order may only be modified by mutual agreement of U.S. EPA and Respondent. Any agreed modifications shall be in writing, be signed by both parties, shall have as their effective date the date on which they are signed by U.S. EPA, and shall be incorporated into this Order.

2. Any requests for a compliance date modification or revision of an approved workplan requirement or an extension of a schedule must be made in writing. Such requests must be timely and provide justification for any proposed compliance date modification or workplan revision. U.S. EPA has no obligation to approve such requests, but may do so. If it does so, such approval must be in writing. Any approved compliance date or workplan modification shall be incorporated by reference into the Order.

XXIV. SEVERABILITY

If any provision or authority of this Order or the application of this Order to any party or circumstances is held by any judicial or administrative authority to be invalid, the application of such provisions to other parties or circumstances and the remainder of the Order shall remain in force and shall not be affected thereby.

XXV. TERMINATION AND SATISFACTION

The provisions of this Order shall be deemed satisfied upon Respondent's and U.S. EPA's execution of an "Acknowledgment of Termination and Agreement to Record Preservation and Reservation of Rights" (Acknowledgment). U.S. EPA will prepare the Acknowledgment for Respondent's signature. The Acknowledgment will specify that Respondent has demonstrated to the satisfaction of U.S. EPA that the terms of this Order, including any additional tasks determined by U.S. EPA to be required pursuant to this Order, have been satisfactorily completed. Respondent's execution of the Acknowledgment will affirm Respondent's continuing obligation (1) to preserve all records as required in Section XIV: Record Preservation and (2) to recognize U.S. EPA's reservation of rights as required in Section XIX: Reservation of Rights, after all other requirements of the Order are satisfied. In addition, upon written request by Respondent, U.S. EPA, in its discretion, will provide written acknowledgment that Work has been satisfactorily completed with respect to any SWMA if it appears on the basis of information available to U.S. EPA that no further Work remains to be done under this Order with respect to such SWMA. Any such acknowledgment does not affect the continued effectiveness of this Order, but is for the administrative convenience of Respondent.

XXVI. SURVIVABILITY/PERMIT INTEGRATION

Except as otherwise expressly provided in this section, this Order shall survive the issuance or denial of a RCRA permit for the Facility, and this Order shall continue in full force and effect after either the issuance or denial of such permit. Accordingly, Respondent shall continue to be liable for the performance of obligations under this Order notwithstanding the issuance or denial of such permit. If the Facility is issued a RCRA permit and that permit expressly incorporates all or a part of the requirements of this Order, or expressly states that its requirements are intended to replace some or all of the requirements of this Order, Respondent may request a modification of this Order and shall, with U.S. EPA approval, be relieved of liability under this Order for those specific obligations.

XXVII. EFFECTIVE DATE

The effective date of this Order shall be the day U.S. EPA signed the Order.

IT IS SO AGREED:

BY: Roy G. Dorrance MAY 5, 1998

Roy G. Dorrance Date
Executive Vice President - Sheet Products
U.S. Steel Group

BY: J F Kaloski May 8 1998

John F. Kaloski Date
General Manager
U.S. Steel-Gary Works

BY: Joseph M. Boyle August 27, 1998

Joseph M. Boyle, Chief Date
Enforcement and Compliance Assurance Branch
U.S. EPA, Region 5

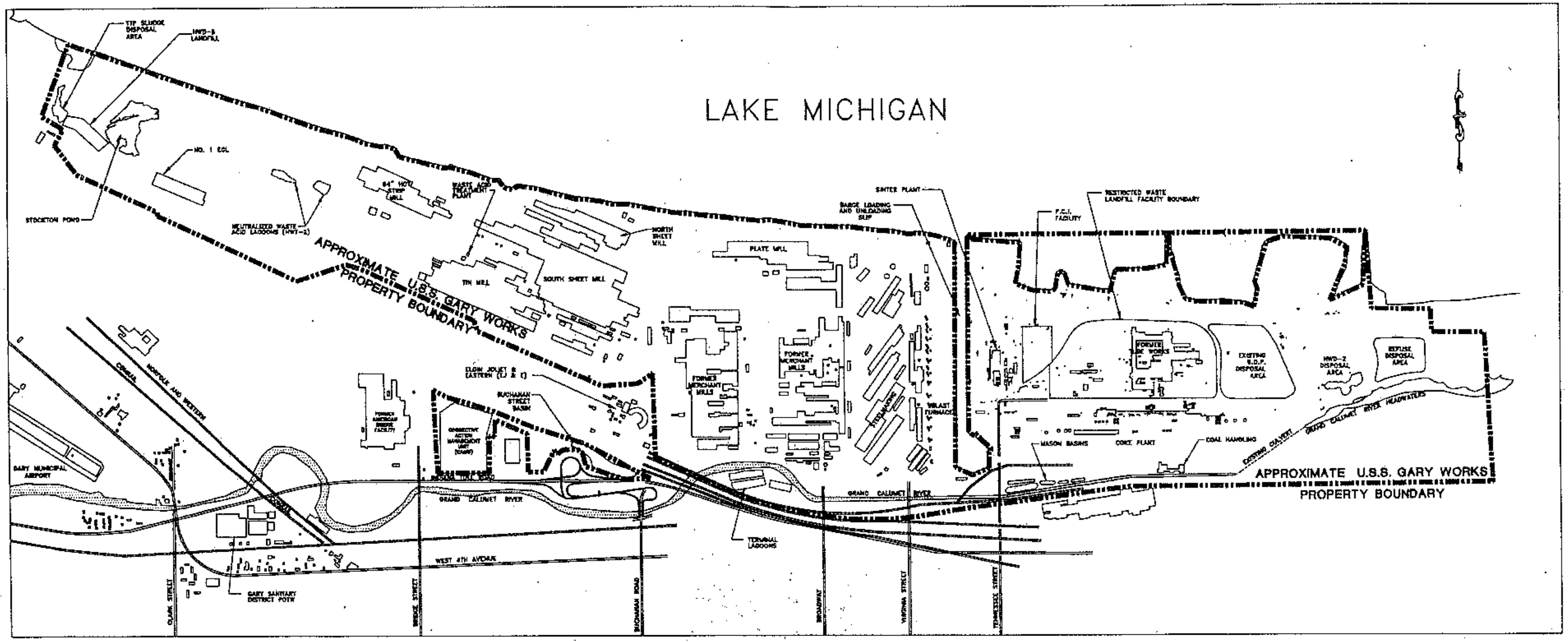
IT BEING SO AGREED, IT IS HEREBY ORDERED THIS 23RD DAY OF October, 1998.

BY: Robert Springer

for Norman Niedergang, Director
Waste, Pesticides and Toxics Division
U.S. EPA, Region 5

Administrative Order
On Consent

U.S. EPA I.D. # IND 005 444 062



0 2500 5000

FACILITY BOUNDARY

United States Steel Corpor[ation]
Gary Works

Baker
Baker Environmental, Inc.

REV	DESCRIPTION	DATE	BY	CHK'D
7				
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2				
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PREPARED	DATE	CHECKED BY	DATE	SCALE
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NO. 21397 DWG. NO. EXHIBIT A

FILE: 21397L18

ATTACHMENT I

STATEMENT OF WORK

GRAND CALUMET RIVER SEDIMENT REMEDIATION PLAN

The purpose of this Statement of Work (SOW) is to set forth the work to be performed, the requirements and criteria that must be met by USX Corporation (acting through U.S. Steel Group) and the schedule of implementation for the removal and management of sediment from the Grand Calumet River (GCR) "project area" as required in the Resource Conservation and Recovery Act (RCRA) Corrective Action Order and the Consent Decree. It is understood that this SOW is a detailed outline of the remediation project and that additional reports, monitoring, and permit application submittals to United States Environmental Protection Agency (EPA) and/or Indiana Department of Environmental Management (IDEM) will be required in the course of the project to further define the requirements and criteria associated with the project. In the event of any conflict between the terms of the SOW and the RCRA Corrective Action Order or Consent Decree, the terms of the RCRA Corrective Action Order or the Consent Decree shall prevail. The Project Area extends from the headwaters culvert located immediately upstream of Gary Works to GCR Transect 36 located 500 feet upstream of the Gary Sanitary District's (GSD) outfall.

The SOW is organized as follows:

1.0 SUMMARY DESCRIPTION OF THE REMEDIATION PLAN

USX agrees to perform the activities set forth in the SOW. The following is a summary of the activities USX will perform pursuant to the SOW, but is not intended to relieve USX of any obligation which may be described in more detail elsewhere.

- Submit complete Workplan(s) and Engineering and Design Reports, as more specifically set forth in Sections 1 and 2, herein.

- Submit to the appropriate governmental agencies complete applications for permits and approvals, and remediate the GCR in accordance with those permits, as well as this SOW and all applicable Federal, State, and local regulations, as more specifically set forth in Section 2, herein.

- Construct and manage an on-site disposal area approvable as a Corrective Action Management Unit (CAMU) under RCRA and as an alternative disposal method under the Toxic Substances Control Act (TSCA), as more specifically set forth in Sections 3 and 6, herein.

- Provide verification of non-native sediment removal through comparison between pre- and post-dredge sediment surveys.

- Remove non-native sediment as measured in the pre-dredge survey in Transects 1 through 11 from within river isolation cells formed by the installation of bulkheads upstream and downstream and impounding, diverting or bypassing flow and placing dredged sediment in a discrete disposal cell within the CAMU, as more specifically set forth in Section 4, herein.

- Remove non-native sediment as measured in the pre-dredge survey downstream of Transect 11 (USX Outfall 018) during open flow conditions in the river channel (i.e., no isolation cells required) and place in the CAMU, as more specifically set forth in Section 4, herein.

- Remove non-native sediment as measured in the pre-dredge survey from Transect 17, Horizon 1 during open flow conditions in the river channel and place in a discrete disposal cell within the CAMU, as more specifically set forth in Section 4, herein.

- Provide Wastewater Treatment for the dredge water generated during sediment removal and monitor prior to conveyance to the Terminal Lagoons for subsequent discharge to the GCR through a permitted National Pollutant Discharge Elimination System (NPDES) outfall, as more specifically set forth in Section 5, herein.

- Perform remediation plan work (i.e., facilities construction and completion of dredging program) following receipt of necessary permits and other approvals, as more specifically set forth in Section 10, herein.

- To the extent practicable, include 6 inches of over-dredging in all of the areas of the GCR to which the SOW applies.

In addition, USX will:

- Conduct an EPA-approved statistically-valid sampling and analysis plan for polychlorinated biphenyls (PCBs) to quantify residual levels in each river isolation cell within Transects 1 through 11, as well as in individual Transects 17, 20, 32, and 34, as more specifically set forth in Section 8, herein.

- Prevent, to the maximum extent possible, any discharge or spill of oil to navigable waters during the remediation project, and in accordance with Federal and applicable State regulations, minimize and properly dispose of spills of oil and other pollutants which may occur during the project.

- Provide funding for an EPA-approved Post-Remediation Monitoring Program three and six years after completion of the GCR dredging, as more specifically set forth in Section 9, herein.

- Evaluate the annual potential for air emissions from the sediment remediation project and the CAMU, provide for ambient air monitoring during the duration of the project, conduct bench scale tests and air modeling to establish site-specific air emissions action levels and operational standards for the project, and submit the proposed air emissions action levels and operational standards to EPA for approval.

- Prepare and implement a health and safety plan consistent with the RCRA Corrective Action Order.

- Prepare and submit a summary of all the dredging activities, volume/sediment verification studies and findings, to the EPA and IDEM within 90 days of the completion of the GCR dredging activities.

The specific activities and methodologies that comprise the remediation plan are summarized below and described in further detail in subsequent sections of this SOW. The Engineering and Design Report Review and Approval Process for all plans and reports listed in Section 2.0 herein is defined in the SOW Compliance Schedule (Section 10) and RCRA Corrective Action Order.

- Sediment Removal: Sediment from Transects 1 through 36 will be removed by hydraulic dredging methods and delivered, via slurry pipeline, to the CAMU. Dredging activities will be confined to the river channel. Non-native sediment will be removed from the river channel with allowances provided for incidental sloughing from "soft-side" areas and over-dredging. The estimated total quantity of sediment to be dredged (i.e., approximately 687,000 cubic yards (cy) consists of (see Table 1):

    559,000 cy of non-native sediment from the river channel.

    38,000 cy of native river bottom material due to incidental over-dredging (i.e., an estimated six inches).

    90,000 cy due to incidental sloughing from soft-side areas.

TABLE I
ESTIMATED SEDIMENT VOLUME in Cubic Yards (CY)

Transect	Nŏn-Native Sediment Within Channel	Soft-Sides Allowance	6-Inch Over-dredge Allowance	Total Quantity
1	2,854	0	322	3,176
2	9,166	0	697	9,863
3	12,717	0	833	13,550
4	15,967	0	992	16,959
5	15,771	0	1,042	16,813
6	14,633	0	1,025	15,658
7	11,205	0	791	11,996
8	8,796	0	537	9,333
9	5,762	0	482	6,244
10	6,113	0	463	6,576
11	4,655	0	486	5,141
12	3,049	0	496	3,545
13	3,420	0	546	3,966
14	1,347	0	537	1,884
15	5,751	0	691	6,442
16	13,213	0	1,000	14,213
17	12,308	0	1,056	13,364
18	17,789	0	1,014	18,803
19	18,466	0	1,116	19,582
20	15,381	0	1,000	16,381
21	10,035	0	778	10,813
22	7,097	0	723	7,820
23	7,104	0	732	7,836
24	4,857	0	792	5,649
25	15,204	0	1,181	16,385
26	32,472	3,115	1,908	37,495
27	26,954	3,183	1,945	32,082
28	28,093	12,616	1,944	42,653
29	32,398	7,693	1,787	41,878
30	25,222	3,347	1,817	30,386
31	25,472	5,404	1,787	32,663
32	31,315	11,809	1,759	44,883
33	30,778	17,942	1,667	50,387
34	31,093	12,274	1,870	45,237
35	41,583	8,467	1,926	51,976
36	10,877	4,257	704	15,838
Total (Rounded Off)	**559,000**	**90,000**	**38,000**	**687,000**

- For purposes of this SOW and the subsequent verification of non-native sediment removal, the pre- and post-dredge surveys (detailed in Section 4.6) define the non-native sediment as the material that is:

    Non-native sediment is soft, dark or black in color and typically consists of fine sands, silts and clayey silts and can be readily differentiated from native sediment on the basis of color, grain size, resistance to penetration, organic content and odor.

    Within the river channel.

    Bounded on the top by the water column and on the bottom by the interface with the native river bottom which is material that is gray and consists of very dense beach and dune sands.

    Bounded by the interconnection of elevation points (spaced nominally at 10-foot intervals) with straight lines outlining the end area template (see Figure 1).

- Sediment removed from Transects 1 through 11 will be dredged from within river isolation cells formed by the installation of upstream and downstream bulkheads. Dredged sediment will be delivered to the CAMU via pipeline in slurry form for disposal. Outfalls discharging to the GCR along the cell being dredged will be intercepted and pumped to the GCR downstream of the cell. Upstream flow will be impounded or bypassed around the cell being dredged. Provision for managing stormwater runoff is included in the design.

- Hydraulic dredging of Transects 17, Horizon 1 will be performed during open-channel flow conditions in the GCR and will precede the dredging of other reaches. Transects 12 through 36 will be hydraulically dredged during open-channel flow conditions following completion of Transect 17, Horizon 1 and concurrent with the dredging of Transects 1 through 11. USX shall perform field surveys of the river channel prior to and following completion of the dredging to verify that the non-native sediment has been removed.

- USX will employ silt screens, oil booms and/or other equivalent suspended solids collection devices during the open channel dredging operation of Transects 12-36 to minimize the re-suspension and downstream discharge of oil and/or other materials. The isolation cells of Transects 1-11 will minimize the downstream migration of resuspended materials. In addition, USX will employee oil booms within the cells to control floating oils.

- Management of Dredged Sediment Slurry: Dredged sediment from the project area (Transects 1 through 36) will be passively dewatered within the CAMU. Sediment from Transects 1 through 11 and Transect 17, Horizon 1 will be passively dewatered within a discrete disposal cell in the CAMU.

- Sediment Disposal: Dredged sediment will be disposed of in the CAMU in accordance with the terms and conditions hereof. The liner, leachate collection and cover systems shall be designed in accordance with RCRA Subtitle C (hazardous waste) landfills (see Figures 2, 3, 4, and 5) and TSCA Section 761.60(a)(5)(iii).

- Management of Dredge Waters: Water from Transects 1 through 11 and Transect 17, Horizon 1 will be processed through a project-specific wastewater treatment plant, monitored and then conveyed to the Terminal Lagoons prior to discharge to the GCR in accordance with IDEM-approved modifications to USX's NPDES permit. The remaining dredge waters from Transects 12 through 36 will be treated and monitored before conveyance to the Terminal Lagoons and discharge to the GCR in accordance with IDEM-approved modifications to USX's NPDES permit.

- The parties acknowledge that implementation of the terms of this SOW will require approval of a CAMU by U.S. EPA pursuant to Section 3008(h) of RCRA. The terms of this SOW shall not become effective until such time as the CAMU is approved.

Figure 1

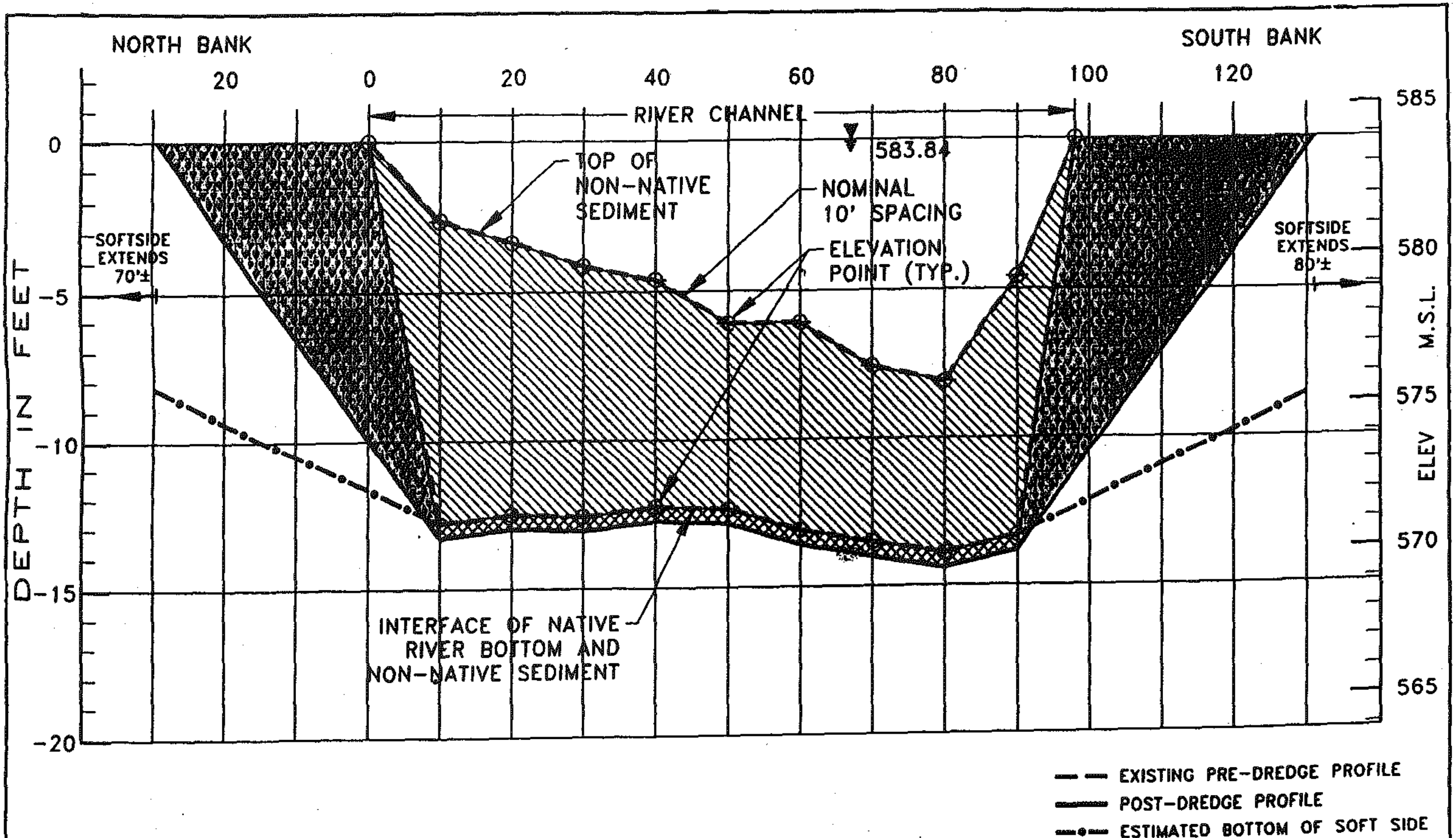


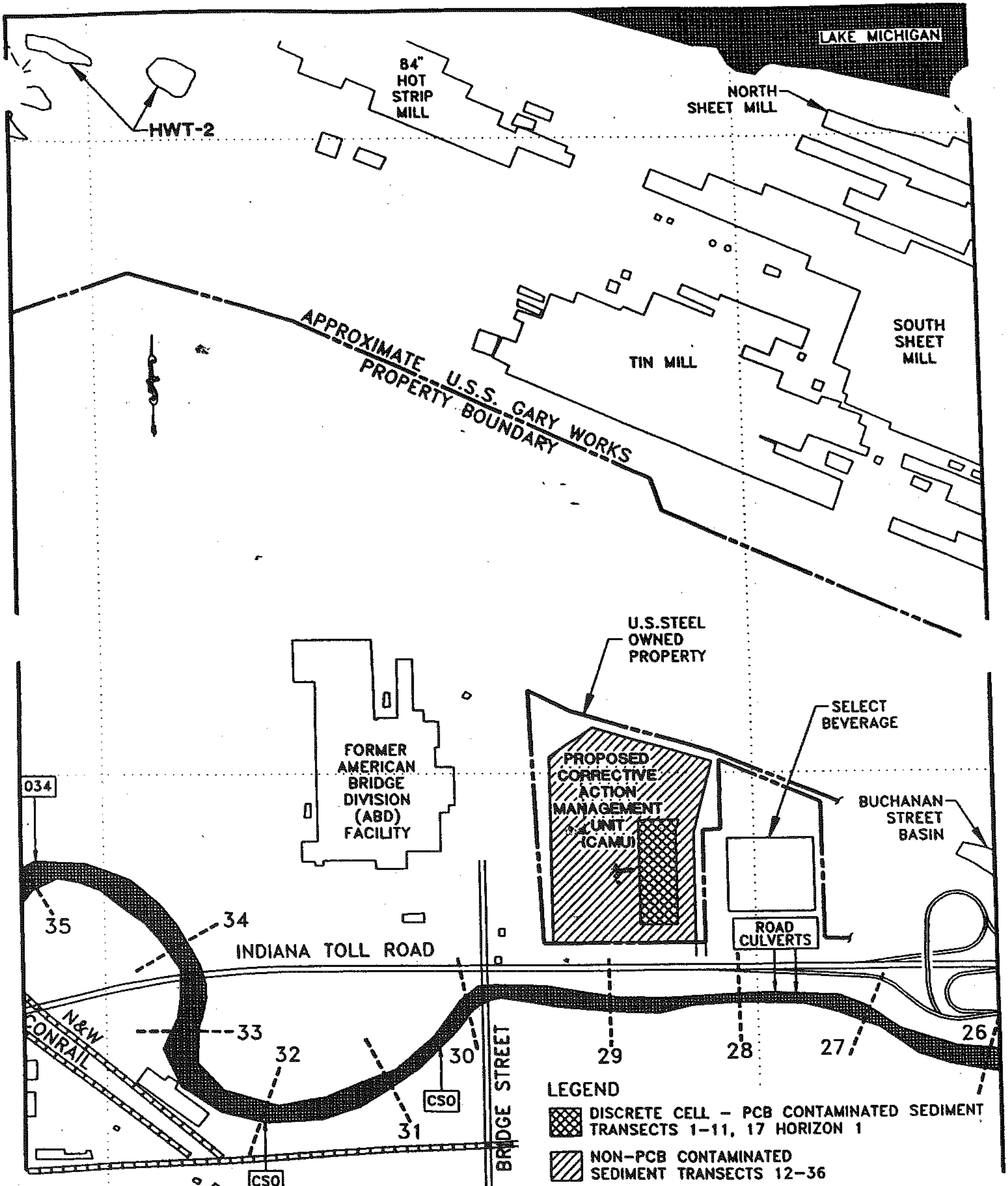
FIGURE 1
TYPICAL GRAND CALUMET RIVER CROSS SECTION
(END AREA TEMPLATE)

SEDIMENT CLASSIFICATION KEY
- NATIVE RIVER BOTTOM
- NON-NATIVE SEDIMENT
- SOFTSIDE SLOUGHING ALLOWANCE
- OVERDREDGE ALLOWANCE OF NATIVE SEDIMENT

⊕ PROFILE LOCATION
▼ WATER SURFACE ELEVATION

2139

Figure 2



SCALE:	1" = 1000'	DATE:	5–5–97
S.O. NO.:	21397	FILE:	21397F66
DSN/DWN:	JWH/DAR	CHK:	JWH

FIGURE 2
SEDIMENT DISPOSAL FACILITIES
LOCATION PLAN

Figure 3

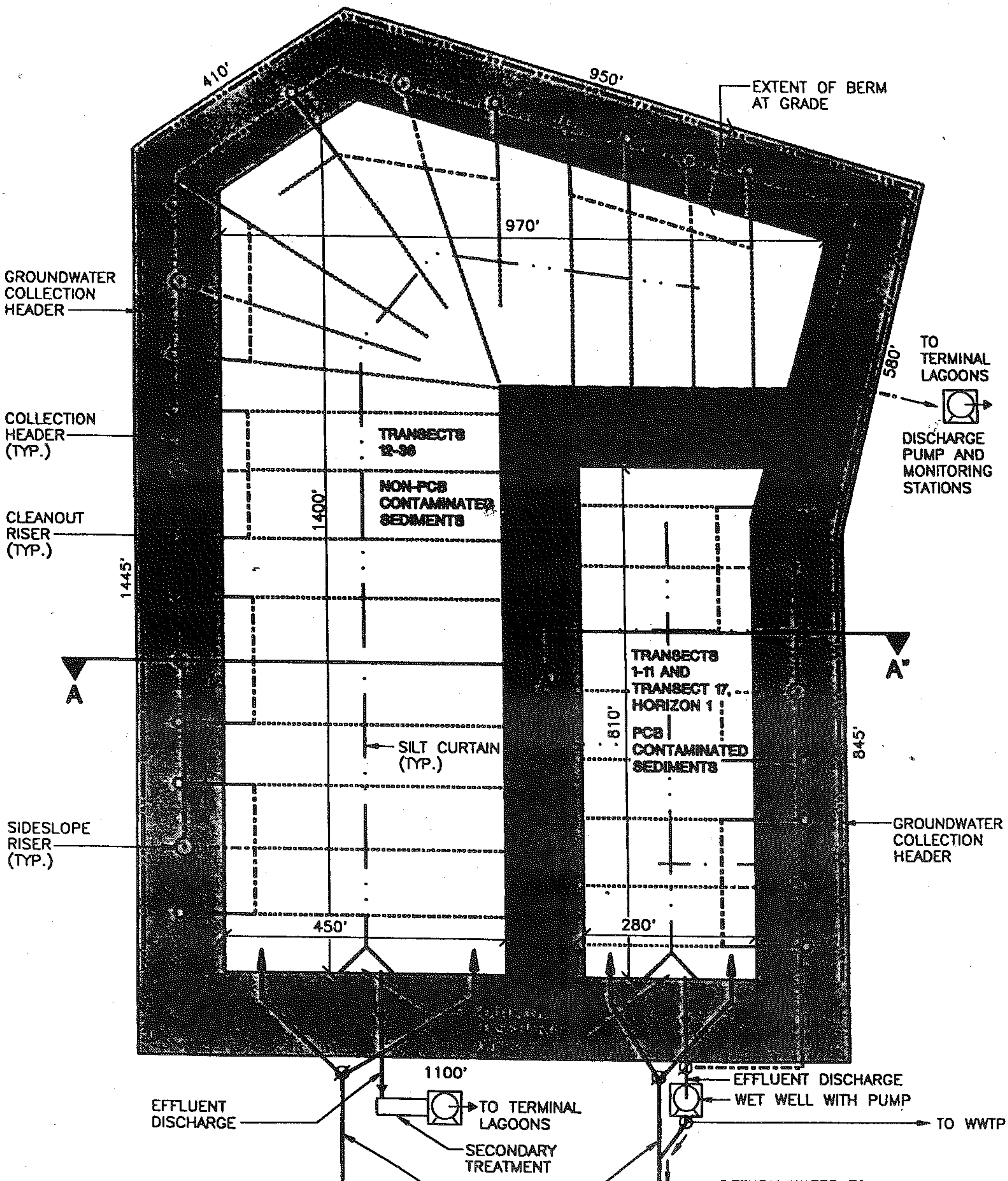


Figure 3
PLAN VIEW
CORRECTIVE ACTION MANAGEMENT UNIT

Figure 4

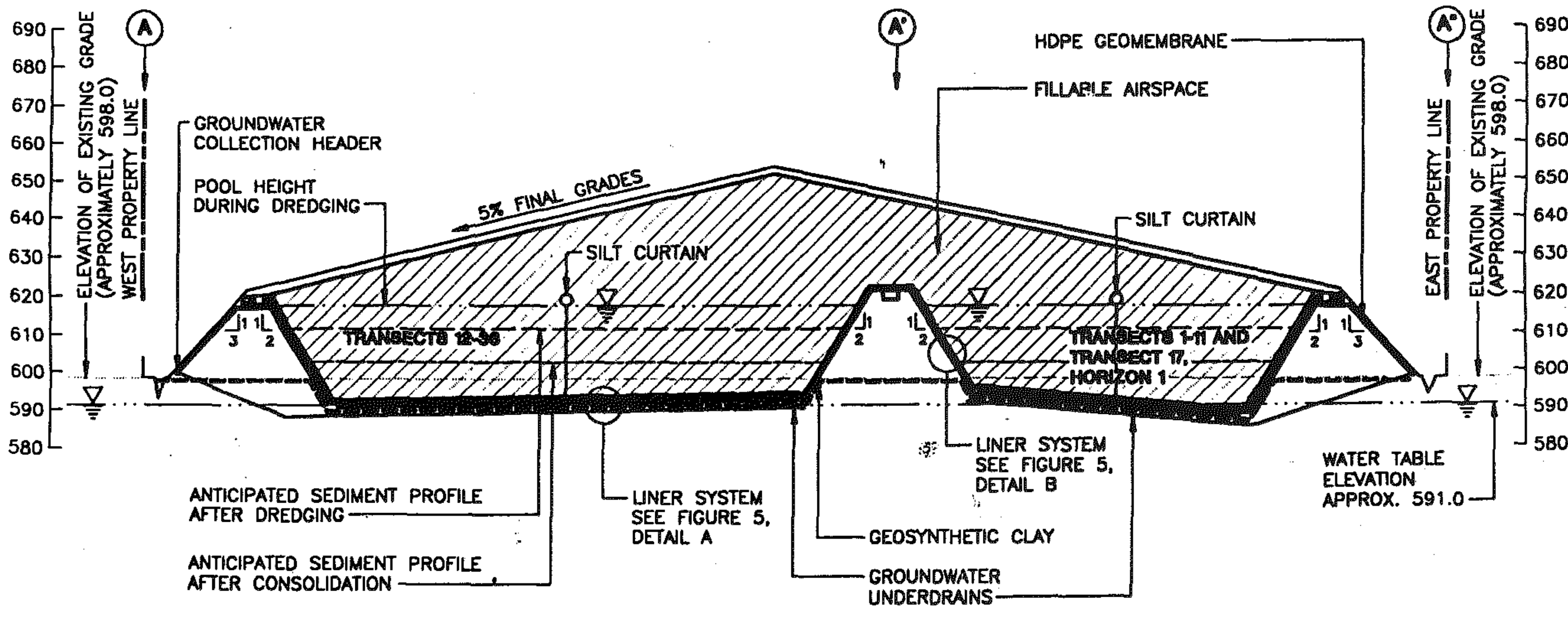
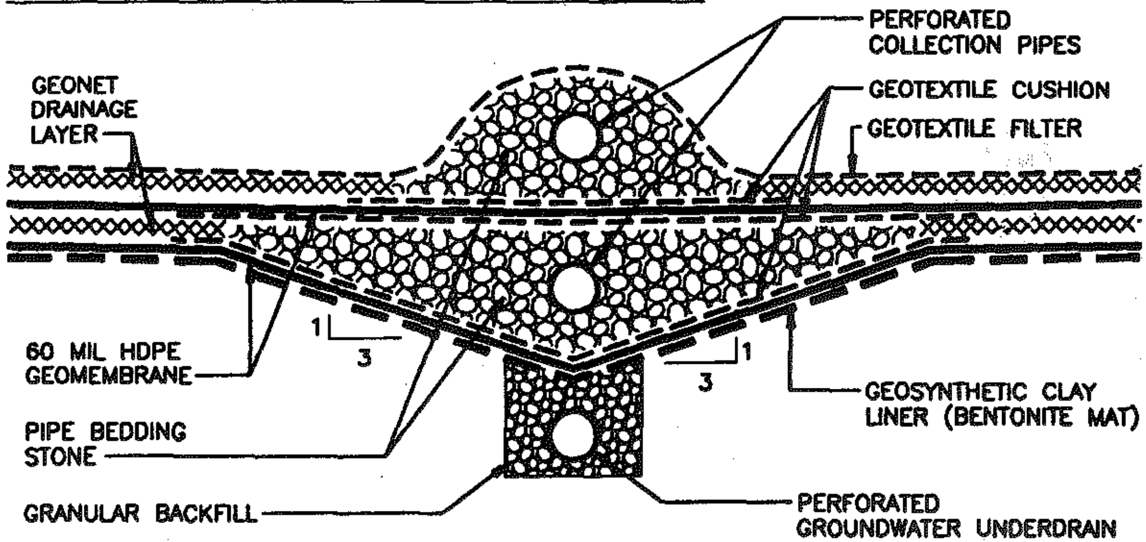


Figure 4
SECTION A-A'-A"
CORRECTIVE ACTION MANAGEMENT UNIT
U.S. STEEL - GARY WORKS
NOT TO SCALE

Figure 5

Detail A Base and perimeter berm liner system



Detail B Interior berm liner system

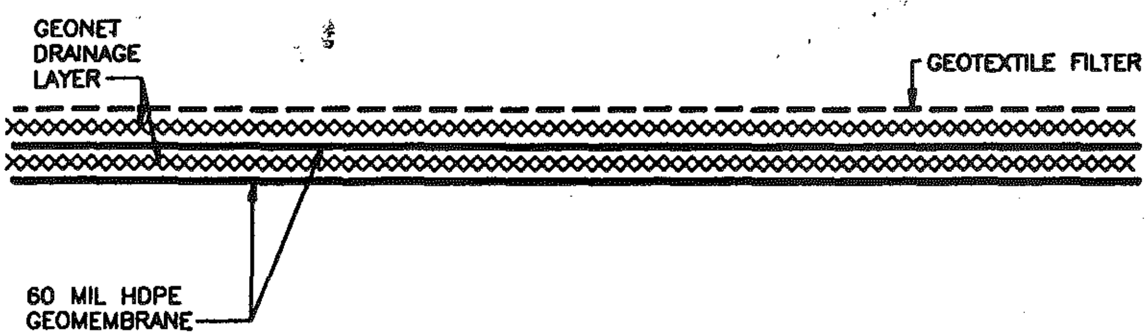


Figure 5
PROPOSED LINER SYSTEM DETAIL
CORRECTIVE ACTION MANAGEMENT UNIT
U.S. STEEL - GARY WORKS
NOT TO SCALE

2.0 ENGINEERING AND PERMITTING

In accordance with the schedule set forth in Section 10 of this SOW, USX shall prepare and submit to EPA for review and approval in accordance with Section X of the RCRA Corrective Action Order and this SOW the following plans, reports or design documents. Each plan and design report shall include a schedule for implementation of the activities described therein, which shall be consistent with the schedule set forth in Section 10 of this SOW. Upon approval by EPA, USX shall implement the approved plan or design in accordance with the approved schedule.

- Sediment Removal Investigation Report(s) which shall include all of the items set forth in Section 2.1.

- Water Treatment Investigation Report which shall include all of the treatability testing and study required in Section 2.2.

- CAMU Investigation and Treatability Report which shall include all of the items set forth in Section 2.3.

- Air Emissions Investigation Report as described in Section 2.4.1 and an air monitoring plan which shall include all of the items set forth in Section 2.4.2.

- Engineering Design for Construction and Operation of the CAMU which shall include design to construct and implement the CAMU requirements set forth in Sections 3.0, 3.1, 3.2, 3.3, 3.5, 3.6, 3.7 and 3.8.

- CAMU Groundwater Monitoring Plan which shall meet the requirements of 40 CFR § 264.552(e)(3) and Section 3.4.

- CAMU Operation and Maintenance Plan which shall meet the requirements of Sections 3.1, 3.4, 3.7, 3.8 and 6.1 through 6.4.

- CAMU Closure and Post-Closure Care Plans as required in Section 6.5.

- Engineering Design for Sediment Removal, including outfall/diversion system and isolation cells to be constructed for Transects 1-11 which includes all of the items set forth in Section 4.4 et. seq.

- Design of dredge, piping systems and ancillary equipment as set forth in Sections 4.3 and 4.3.1

2.1 Sediment Removal Investigation Reports

To accomplish removal, separate sediment removal schemes were developed for Transects 1 through 11 and Transects 12 through 36. To support these activities and allow design of river diversion facilities and isolation cells, the following actions will be performed and included in the Sediment Remedial Investigation Report(s):

- Topographic mapping of the GCR and surrounding area to support:

  Establish vertical and horizontal control for pre- and post-dredge surveys.

  Design layout of support facilities.

  Base mapping for contractor payment and sediment quantities

  Design of pipeline routes.

  Identification of critical river facilities and horizontal and vertical clearances.

- Investigation of critical river facilities to:

  Identify facilities that could be impacted by removal operations, such as outfall structures; underground and above-ground utilities; foundations for piers, abutments and retaining walls; and existing sheet pile walls.

  Develop specifications detailing relocation, temporary supports and or replacement procedures and operating procedures during removal.

- Hydrologic and hydraulic analyses to determine design flows; water velocities, diversion system components size, type and location; and water elevations for design of river and headwaters diversion systems.

- Hydraulic analysis to determine post-dredge water gradient in headwaters reach of East Branch of GCR.

- Evaluation of source point control (at dredge) for oil/grease management.

- Survey and estimate the quantity of debris, both embedded in sediment and on banks, associated with dredging program and develop a plan to locate, collect, process and recycle or dispose.

- Plan overland pipeline routings to/from CAMU, project-specific treatment plant, and Terminal Lagoons.

- Evaluate and select sites for decontamination activities and develop decontamination protocols and procedures.

- Locate and evaluate foundation conditions, earthwork requirements and structural needs for downstream access ramps, platforms and roadways, etc.

- Evaluate foundation conditions for installation of bulkhead structures at river isolation cells.

- Evaluate and select method for tie-in of bulkhead structures to Outfalls 005 and 010.

- Evaluate and design culvert bulkhead and isolation cell bulkheads and weirs.

2.2 Water Treatment Investigation and Studies

USX shall obtain appropriate NPDES permit authorization for the discharge of waters generated during primary liquids-solids separation from dredging operations, supernatant waters from the CAMU and leachate generated from subsequent secondary dewatering (e.g., leachate/wick drain system) operations and shall treat and monitor such waters pursuant to the permit prior to discharge.

At a minimum, USX shall propose to NPDES permitting authorities the level of treatment to these waters described below:

Source	Treatment	Discharge
Dredge waters (first pass) Transects 1-11 and Transect 17, Horizon 1	Recirculated via closed loop with provision for oil and grease removal	Return to active isolation cell within GCR
Dredge waters (second [cleanup] pass) Transects 1-11	Recirculated via closed loop with provisions for oil and grease and suspended solids removal	Return to active isolation cell within GCR
Dredge waters GCR Transects 12-36	Oil and grease and suspended solids removed through clarifier	Terminal Lagoons Outfall 030/028
GCR isolation Cell water Transects 1-11	Project-specific Treatment Plant	Terminal Lagoons Outfall 030/028

Source	Treatment	Discharge
CAMU - Groundwater under-drain system	None	Terminal Lagoons Outfall 030/028
CAMU - leachate collection system including secondary dewatering	Project-specific Treatment Plant	Terminal Lagoons Outfall 030/028
CAMU - supernatant Transects 1-11 and Transect 17, Horizon 1	Project-specific Treatment Plant	Terminal Lagoons Outfall 030/028
CAMU - supernatant Transects 12-36	Oil and grease and suspended solids removal	Terminal Lagoons Outfall 030/028
CAMU - post dredge contact storm water	Project-specific Treatment Plant	Terminal Lagoons Outfall 030/028
CAMU - post dredge non-contact storm water	None	Terminal Lagoons Outfall 030/028

Final treatment and treatment levels will be established in the NPDES permit as determined by IDEM.

USX shall conduct treatability testing and studies to determine the appropriate treatment and to design the project-specific treatment plant and other control equipment. The following treatability testing shall be conducted:

- Evaluate, test and design CAMU chemical treatment systems (e.g., selection of polymers/coagulants/surfactants, dosage rates, mixing requirements, residence time, etc.).

- Organics removal for treated water from Transects 1 through 11 and Transect 17, Horizon 1.

- Finalize process schematic for water treatment plant based on regulatory discharge limits.

- Conduct bench-scale testing as required to support design.

2.3 CAMU

USX shall conduct engineering investigations and treatability studies required to support the design of the CAMU. These studies and investigations, some of which are ongoing or completed, consist of the following:

- Characterization of the aquifer adjacent to the CAMU sufficient to provide information needed to determine the number and placement of groundwater monitoring wells and evaluate the surcharge due to construction/operation of the CAMU.

- Conduct geotechnical investigation of subsurface conditions and strength testing/evaluation of site materials for construction of CAMU foundation and dikes.

- Test in situ soils to evaluate for possible use in dike construction.

- Evaluate availability of off-site borrow sources (e.g., sand and structural materials) and study engineering properties if a shortfall of suitable on-site materials occurs.

- Evaluate secondary dewatering alternatives (e.g., leachate system design, spacing of wick drains, establishment of vegetative cover, etc.).

- Conduct time rate/consolidation testing of sediments and evaluate polymer bulking impacts.

- Evaluate and select methodology for containing and collecting floating oils and greases in CAMU.

2.4 Air Emissions

USX shall develop and submit for EPA approval a plan to:

- Evaluate and minimize air emissions from dredging.

- Investigate and evaluate air emissions from operation of CAMU. Such evaluations shall, at a minimum, evaluate potential risks to public health or the environment, if any, resulting from the operation of the CAMU.

2.4.1 Air Emissions Investigation Work Plan

USX shall develop and submit for U.S. EPA approval a plan to conduct bench-scale studies and to investigate and evaluate air emissions from the dredging and CAMU operations. Such evaluation shall, at a minimum, evaluate potential risks to human health or the environment from dredging activities and/or operation of the CAMU. Upon approval or modification and approval by U.S. EPA, USX shall carry out the activities set forth in the plan and provide a report to U.S. EPA for approval.

2.4.2 Air Monitoring Plan

Upon approval of the report set forth in Section 2.4.1 above, USX shall submit to U.S. EPA for approval an Air Monitoring and Operations Plan. The Air Monitoring and Operations Plan shall include the following:

Description of ambient air monitoring program, including, but not limited to, provisions sufficient to ensure that there is no threat to the human health or the environment from potential releases. The locations of air monitoring devices shall be based upon dispersion modeling and the location of potential receptors.

Operating procedures to minimize, to the maximum extent practicable, air emissions from dredging activities and CAMU operations.

Provisions to minimize odors from dredging activities and the CAMU to the maximum extent practicable.

Proposed action levels, the exceedence of which will trigger the activities described in the Air Contingency Plan, below. Such action levels shall be established so as to protect human health or the environment which allows for an adequate margin of safety.

The Air Monitoring and Operations Plan shall include a contingency plan which shall be triggered upon exceedence of any action level in the approved Air Monitoring and Operations Plan. The Contingency plan shall include a detailed procedure for responding to any exceedence. At a minimum, the plan shall include the following responses activities and action levels which will trigger the activities:

Immediate notification of U.S. EPA orally and in writing within fourteen (14) days after discovery of any exceedance
Modification of operations to control emissions
Cessation of operations to control emissions
Procedures for proposing corrective measures to ensure protection of human health and the environment which shall be implemented upon approval by U.S. EPA.
Procedures for conducting a risk-based assessment where determined by U.S. EPA to be necessary.

USX shall implement the Air Monitoring and Operations Plan according to its terms upon approval or modification and approval by U.S. EPA.

2.5 Permitting

USX shall submit complete applications for the following permits and approvals; including but not limited to:

- Corps of Engineers - CWA Section 404/Rivers and Harbors Act Section 10 dredging permit and associated State CWA Section 401 Water Quality Certification

- CWA NPDES permit modification for interim discharge limitations associated with dredging operation and other project related discharges

- IDEM-Waste Water Treatment Construction Permit

- IDNR - Permit for Construction in a Floodway

- TSCA PCB Alternative Disposal Method approval pursuant to 40 CFR Section 761.60(a)(5)(iii).

- IDEM - Air and TSCA Permits as required.

- City of Gary Special Use Permit and Landfill Variance.

USX shall comply with the requirements set forth in the permits and RCRA CAMU Designation and the TSCA Alternative Disposal Method approvals.

3.0 CAMU CONSTRUCTION

USX shall design and construct the CAMU to meet requirements established for hazardous waste disposal facilities as set forth in 40 CFR Part 264, Subpart N.

3.1 Site Security

USX shall construct and maintain security fencing at the CAMU in order to prevent access to the site and vandalism to the components of the CAMU. This maintenance shall include repair to fencing and gates, when necessary, to maintain proper security. Warning signs shall be posted at 200-foot intervals along the fence and at all gates. The warning signs shall advise that the area is a waste disposal site which may pose a risk to public health through direct contact. The signs shall also provide a telephone number to call for further information.

3.2 Restrictive Covenants/Deed Restrictions

Prior to waste disposal in the CAMU, USX shall execute and record with the Lake County, Indiana Recorder the restrictive covenants and deed restrictions addressing the subject parcel in accordance with 40 CFR § 264.119.

3.3 <u>Site Preparation/Discharge Pipeline</u>

USX shall clear and grub the CAMU site of the existing vegetation and level the existing berms on the site. The native topsoil shall be stripped and stockpiled on or adjacent to the site for later use during site closure. USX shall design and construct a discharge pipe from the CAMU site to the Terminal Lagoons within the Gary Works complex for the conveyance of treated water and waters not requiring pre-treatment (e.g., construction groundwater). A permanent under-drain system consisting of perforated drainage piping installed in trenches below the design sub-base grades shall be installed with the appurtenant collection headers and pumps. This under-drain system shall be designed to function as a means for water management during construction and for depressing the water table during site operation. USX shall be allowed, upon written EPA approval, to terminate pumpage from the under-drain system after the CAMU is completely constructed and operation has commenced to a point whereby it can be demonstrated to the satisfaction of the EPA, through engineering analysis, that the integrity of the liner and leachate collection system will be maintained. The collection headers shall be connected to the discharge line, and USX will initiate operation of the drainage system sufficiently in advance of the construction of the containment berms. Waters collected in the under-drain system shall be discharged to the Terminal Lagoons without pre-treatment.

3.4 Monitoring System

USX shall prepare and submit a CAMU monitoring plan which meets the requirements of 40 CFR § 264.552(e)(3) and addresses the following:

- Groundwater monitoring for the CAMU which meets the criteria set forth in 40 CFR Section 264.552(e)(3). All monitoring shall be conducted for the hazardous constituents contained in 40 CFR 264, Appendix IX ("Appendix IX Constituents") and pH and conductivity. The parties recognize that it may not be necessary to continue to monitor for all of the Appendix IX Constituents if they are not detectable in the groundwater or present at levels of concern. Accordingly, after a period of monitoring sufficient to characterize the groundwater, USX may propose that monitoring of these parameters be discontinued or decreased. Upon U.S. EPA and IDEM approval, such monitoring may be discontinued, decreased or otherwise modified.

- Monitoring of waters discharged to the Terminal Lagoons. All monitoring shall be conducted for the hazardous constituents contained in 40 CFR 264, Appendix IX ("Appendix IX Constituents") and pH and conductivity. The monitoring plan shall also include provisions for testing of PCBs, pH, specific conductivity, and chlorinated organics in a manner consistent with 40 CFR 761.75(b) for the TSCA subcell. The parties recognize that it may not be necessary to continue to monitor for all of the Appendix IX Constituents if they are not detectable in the discharge water or present at levels of concern. Accordingly, after a period of monitoring sufficient to characterize the discharge water, USX may propose that monitoring of these parameters be discontinued or decreased. Upon U.S. EPA and IDEM approval, such monitoring may be discontinued, decreased or otherwise modified. The monitoring plan shall contain contingency plans to prevent water discharges to the Terminal Lagoon above levels that pose a potential threat to human health or the environment.

- Waters from the under-drain system
- Stormwater runoff
- Discharge to Terminal Lagoons and the Project-Specific Treatment Plant
- Slope and cover integrity
- Air monitoring program for the CAMU

The monitoring plan shall address the design of the monitoring devices, frequency and methods for monitoring, laboratory analysis, data evaluation procedures, and reporting format and frequency requirements.

3.5 Site Excavation/Berm Construction

USX shall characterize the physical and chemical characteristics of soils in the area on which the CAMU shall be constructed. Such soils may be used for berm construction provided that their physical and chemical characteristics indicate that they will not pose a threat to human health and the environment if used in the berm and are otherwise suitable for use as berm materials. All unsuitable materials will be removed and managed appropriately. The average depth of excavation is estimated to be 8-10 feet across the entire site. The berms shall be generally positioned and configured as shown on Figure 3 and will circumscribe an area of approximately 40 acres. An interior berm shall bisect the structure to form a separate disposal cell for the sediments from GCR Transects 1 through 11 and Transect 17, Horizon 1. The berms will be positioned so that the inside of the top of the berm will be setback a minimum of 50 feet from the edge of the property line around the perimeter of the site. Allowances shall be made in the setback zone for 10-20 foot wide perimeter access roads on the west and east, stormwater ditches and sedimentation basins, and conveyance piping.

The berms will be underlain by a geo-synthetic clay liner which, after completion of the berm construction will be fused to the bottom layer of the liner system. The berms shall have exterior slopes of no greater than 1V:3H and inboard slopes of not greater than 1V:2H. The berms will generally be 12 to 15 feet wide at the crest. The actual height of the berms shall be determined during the design but shall be sized to contain a 23 feet thick average saturated sediment column, a minimum four (4) feet thick water pool and a two (2) foot freeboard. The exterior slopes of the berms will be covered with a minimum of six (6) inches of topsoil and hydro-seeded with a grass seed mixture that will be determined during the design. USX shall maintain the exterior slopes of the berms during construction, operation, closure and post-closure to preserve the structural integrity of the berms.

3.6 Liner and Leachate Collection System

USX shall design and construct a liner and leachate collection system that shall meet the requirements of RCRA Subtitle C, 40 CFR § 264 Subpart N, and 40 CFR § 761.60(a)(5)(iii), USX has proposed the following:

- A geo-synthetic clay liner.

- A 60 mil High Density Polyethylene Geo-membrane (HDPE) or equivalent.

- A geo-synthetic secondary drainage layer (i.e., Geo-net™ or equivalent).

- A 60 mil HDPE Geo-membrane or equivalent.

- A geo-synthetic primary drainage layer (i.e., Geo-net™).

- A geo-textile filter.

The leachate collection system will be segregated into separate drainage modules which shall slope to collection lines centered in the modules. The drainage collection shall be equidistantly spaced and shall slope to side-slope collection headers positioned along the base of the exterior berms. The collection headers shall connect 2-3 collection lines to a side-slope riser. Separate side-slope clean-out risers will be provided for each collection line. The collection lines for each drainage layer shall consist of a minimum 6-inch diameter perforated drainage line bedded in a one (1) foot thick stone trench. The HDPE geo-membranes will be protected from the stone by geo-textile cushions. The side-slope risers for each drainage layer shall be connected to a perimeter collection header that will be trenched into the crest of the exterior berms. The HDPE geo-membranes will extend up to and wrap under the collection header trenches. As part of the design, USX shall include an analysis conducted to demonstrate compatibility of the proposed liner materials with the GCR sediments to address concerns regarding primary geo-synthetic drainage layer clogging and/or other related problems.

Separate collection headers shall be provided for each disposal cell. The collection headers for Transects 1 through 11 will be connected to a discharge line that conveys the collected waters to a wet well from which the CAMU effluent can be recirculated, via closed loop, to the active GCR isolation cell during dredging operations or to the project-specific treatment plan following completion of dredging operations. The effluent from the treatment plant will be monitored and subsequently conveyed to the Terminal Lagoons for discharge to the GCR through permitted Outfall 030 and/or Outfall 028.

The header for the Transects 12 through 36 cell shall initially be connected to the secondary treatment system, and subsequently monitored and conveyed, via discharge line, to the Terminal Lagoons. After completion of the GCR dredging project and prior to the start-up of the secondary dewatering of the sediments in the CAMU, the collection header will be connected to the discharge line which conveys water from the CAMU to the on-site project-specific treatment system.

3.7 Secondary Treatment System

USX shall design and construct a secondary treatment system for the removal of suspended solids and free floating oil that may persist in the discharge from the Transect 12 through 36 cell after primary solids-liquids separation. The secondary treatment system shall effectively and continuously remove suspended solids and free floating oil prior to discharge to the Terminal Lagoons. Solids will be returned to the CAMU.

The secondary system shall consist of, but not be limited to, clarifiers that are located inside or outside the perimeter berms of the CAMU.

3.8 Interior Baffles/Oil Skimming at CAMU

USX shall design and install a system of vertical baffles or silt curtains within each of the cells of the CAMU to maximize retention time in the basins, and to collect floating oils and greases in traps along the berms. The baffles will be anchored at the bottom with non-penetrating concrete blocks and suspended by floats tethered in place with cable stays anchored on the berms.

USX shall provide oil collection devices, equipment, necessary personnel and a system to convey the collected oil to a temporary above ground storage tank during the operation of the CAMU. The storage tank shall be constructed in accordance with State of Indiana regulations for above ground storage tanks (ASTs) and shall at a minimum have adequate secondary containment and sampling ports to facilitate waste characterization testing. Representative samples of the tank contents will be tested to determine the appropriate recycling or disposal options. Thereafter, USX shall recycle or dispose of the collected oil in accordance with 40 CFR 761.60.

4.0 SEDIMENT REMOVAL

4.1 Engineering and Design

The method for remediation of the GCR is removal of non-native sediments from the river bottom and incidental over-dredging and incidental removal from side-slopes followed by disposal in the CAMU. The removal of sediments will be accomplished by hydraulic dredging operations. Prior to removal of sediments, USX shall perform the sediment removal and engineering design activities described in Section 2.1 to prevent to the extent practicable water and air discharges and the re-suspension and downstream migration of sediments.

USX shall conduct technical studies; prepare designs for sediment removal, river and outfall flow bypassing; and apply for all necessary permits as further set forth herein.

4.2 Transect and Horizon Identification

The length of the GCR between the headwaters culvert immediately upstream of (Gary Works) and Transect 36 located approximately 500 feet upstream of the GSD Sewage Treatment Plant outfall was divided into 36 transects. The location of each transect was designated by both USX and EPA Region V and generally, spacing between transects varies from approximately 500 to 1,000 feet. Within each transect interval, sediments were delineated at specific depths (horizons). The transect and horizon designations were established for sediment sampling and analysis purposes.

Horizons were established as follows in the Sediment Characterization Study (SCS- Conducted by USX and submitted to EPA Region V in January 1993):

- Horizon One - The top portion of the non-native sediments (up to 7.9 feet thick), defined by core measurements.

- Horizon Two - A second layer of the non-native sediments (from 5.0 to 12.9 feet, when sediment thickness is greater than 7.9 feet).

- Horizon Three - The remaining non-native sediment (from 10.0 feet to the native river bottom when sediment thickness is greater than 12.9 feet).

Delineation of the transects and horizons is shown on Drawing No. 1.

4.3 Dredge Selected for GCR Sediment Remediation

The cutter-head dredge (swinging ladder type) is the most suitable and versatile tool for hydraulic dredging of the GCR for the following reasons:

- Minimizes re-suspension of sediments.

- Ability to work efficiently in close quarters and without shore anchors/cables.

- Compound motion (i.e., side to side and up/down) of the cutter/suction system in confined areas enables the dredge to follow irregular terrain when hull motion is fixed by on-board spuds.

- Sediment can be excavated in both swing directions until the desired depth of cut is achieved.

- Dredge can be reconfigured as a conventional, fixed-ladder dredge to accommodate dredging of the wider sections of the river.

The dredge will be extensively modified to customize it for use on the GCR. If required, these modifications may include a redesign to achieve a low profile hull, that is, a superstructure designed to enable navigation under the low-clearance bridges.

4.3.1 Engineering Design of Dredge, Piping Systems and Ancillary Equipment

The engineering design will include:

- Design of reversible high specific gravity, long-line (multi-boost) slurry transport system with remote control and monitoring systems.

- Design, source and construct custom dredge and process equipment.

4.4 Sediment Removal Plan

USX shall remove, via hydraulic dredging, the non-native sediments between and including Transect 1 and Transect 36 (refer to Table 1 and Drawing No. 1). USX will not undercut the banks and will not significantly alter the stability of the existing banks of the GCR after dredging operations are completed.

During the period of dredging activities, USX shall secure the site of dredging operations by temporary fences or other suitable method, so as to prevent persons, especially children, from coming into contact with dredging operations.

Prior to dredging of any reach, USX shall conduct debris removal. This activity will involve the collection, removal, processing and disposal of debris embedded in the sediment and above the water line along the banks. Organic debris (e.g., trees and vegetation) removed above the water-line will be chipped and spread along the adjacent bank.

To accomplish removal between Transects 1 through 11 and between Transects 12 through 36, separate sediment removal schemes have been developed.

4.4.1 Transects 1 through 11

Specific procedures for dredging within the three individual river isolation cells have been developed for hazardous and toxic sediment removal within Transects 1 through 11. This approach has been developed to prevent the downstream release of contamination from re-suspension of sediment.

Figures 6 through 10 schematically depict the staging plan for dredging Transects 1 through 11.

4.4.1.1 Cell Locations

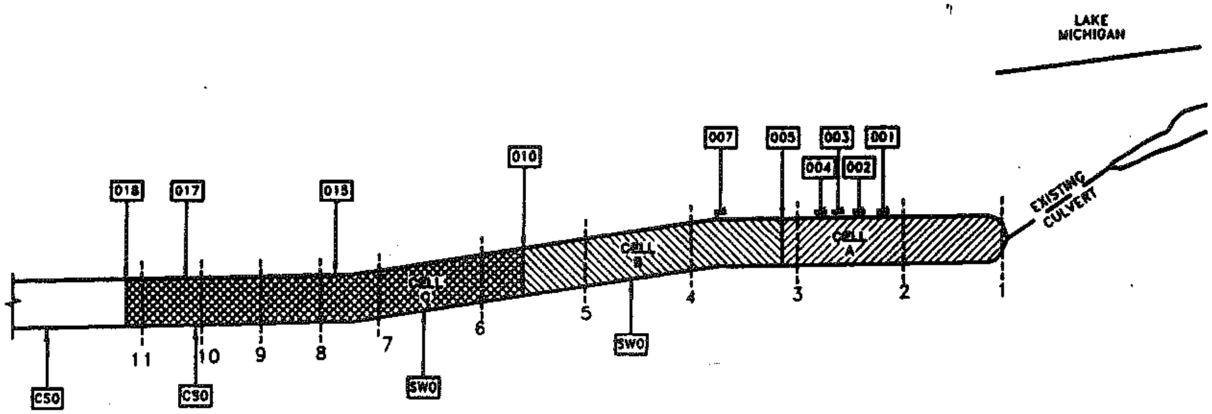
The cell locations have been selected to minimize the amount of water to be bypassed. For purposes of this application, the cells have been labeled Cells A, B and C.

Cell A will extend from the outlet of the existing 60-inch headwater culvert to Outfall 005, which is located between Transects 3 and 4. Cell B will extend from Outfall 005 to Outfall 010 which is located approximately midway between Transects 5 and 6. Cell C will extend from Outfall 010 to Outfall 018, which is just downstream of Transect 11. The locations of these outfalls and cells are shown on Figure 6. Cell limits were determined based on locations of plant outfalls that discharge high flow rates.

4.4.1.2 Temporary Bulkheads

USX shall install temporary bulkheads as barriers to isolate the active cell (i.e., the cell being dredged) from the river. The bulkheads will be placed in proximity to Outfalls 005, 010 and 018. For dredging in Cell A, a temporary bulkhead will be installed at Outfall 005. For Cell B, the temporary bulkhead at Outfall 005 will be retained (although flow from 005 will be directed into former Cell A) and a second bulkhead installed at Outfall 010.

Figure 6



ISOLATION CELL LOCATIONS

DISCHARGE	ESTIMATED DESIGN FLOW RATE		PIPE DIAMETER (Inches)
	MGD	GPM	
STORMWATER RUNOFF [a]			
CELL A (HEADWATERS)	14.2	9,800	2 @ 36(INLET) & 1 @ 60(OUTLET)
CELL B	20.0	13,900	
CELL C	178.5	124,000	
OUTFALLS: [b]			
001 [f]	0.1	70	12
002	0.0 [c]	0	--
003 [f]	0.2	140	12
004 [f]	0.3	210	12
005 (GW-1A)	69.5	48,300	84
007 (GW-2)	0.0 [d]	0	72 X 42 [e]
010 (GW-3)	1.8	1,300	72
015 (GW-4)	2.2	1,500	72
017 (GW-5)	0.08	40	72

(a) FLOW RATES BASED ON PRELIMINARY ESTIMATES OF STORMWATER RUNOFF FOR A 2-YEAR FLOOD.

(b) FLOW RATES FOR OUTFALLS 005, 010, 015, AND 017 ARE BASED ON JULY AND AUGUST FLOWS RECORDED BY U.S. STEEL GARY WORKS ASSUMING A 95% UPPER CONFIDENCE LIMIT. FLOW RATES FOR OUTFALLS 001, 003 AND 004 OBTAINED FROM U.S. STEEL GARY WORKS.

(c) OUTFALL 002 HAS BEEN SEALED.

(d) OUTFALL 007 HAS BEEN SEALED AND FLOW HAS BEEN DIVERTED TO OUTFALL 005.

(e) OUTFALL 007 IS OVAL.

(f) FLOW WILL BE DIVERTED TO 050 OR 010 PRIOR TO INITIATION OF DREDGING.

LEGEND

- TRANSECT LOCATION
- 005 U.S. STEEL OUTFALL LOCATION
- CSO COMBINED SEWER OVERFLOW
- SWO STORMWATER OUTFALL
- CELL A
- CELL B
- CELL C

GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

EXISTING CONDITIONS
TRANSECTS 1 THROUGH 11

United States Steel Corporation
Gary Works

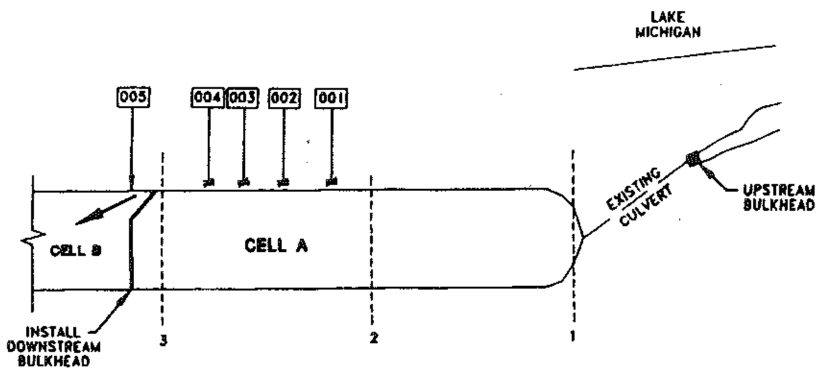
Baker
Baker Environmental, Inc.

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
DAD	08/93	JWH	6/93	NONE

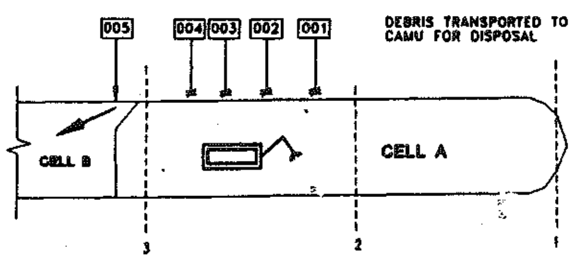
PROJECT NO. 21397
CAD FILE: 21397F56

FIGURE NO. 6

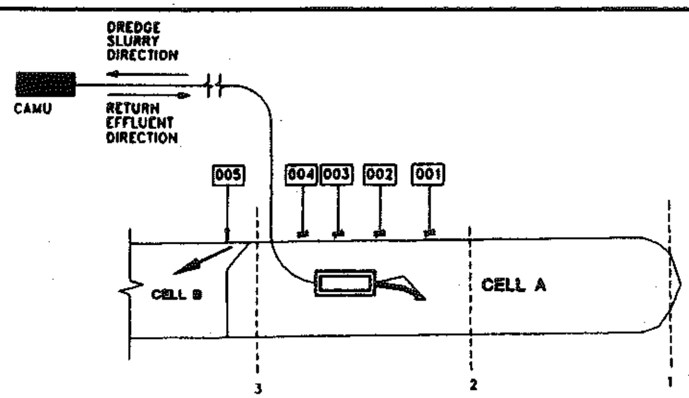
Figure 7



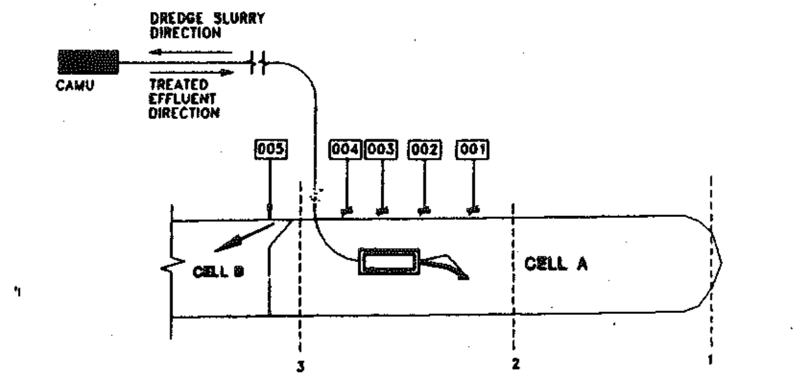
CELL A - ISOLATION



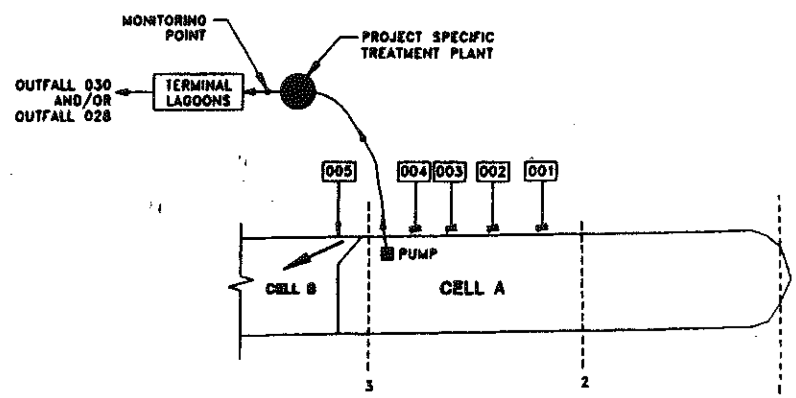
CELL A - DEBRIS REMOVAL



CELL A - INITIAL PASS WITH HYDRAULIC DREDGE



CELL A - SECOND (CLEANUP) PASS WITH HYDRAULIC DREDGE



CELL A - WATER TREATMENT

LEGEND

TRANSECT LOCATION

005 U.S. STEEL OUTFALL LOCATION

CSO COMBINED SEWER OVERFLOW

SWO STORMWATER OUTFALL

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GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

CELL A ISOLATION AND
DREDGING OPERATIONS

USS United States Steel Corporation
Gary Works

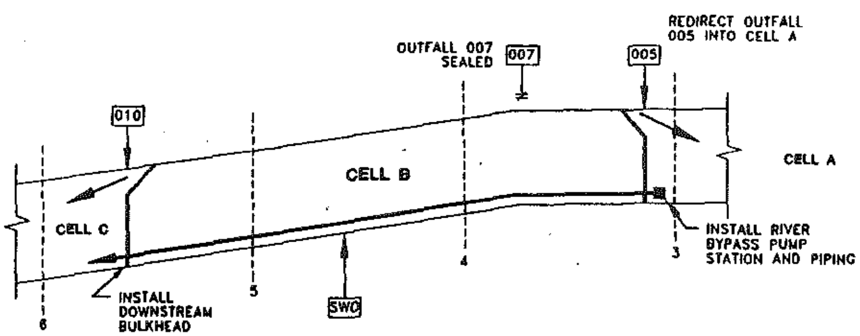
PREPARED BY	DATE	CHECKED BY	DATE	SCALE
DAB	12/94	JWH	6/95	NONE

PROJECT NO. 21397

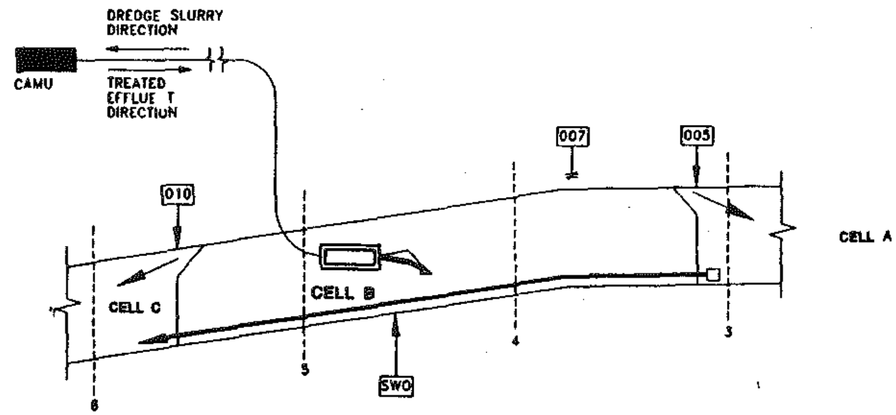
CAD FILE: 21397F60

FIGURE NO. 7

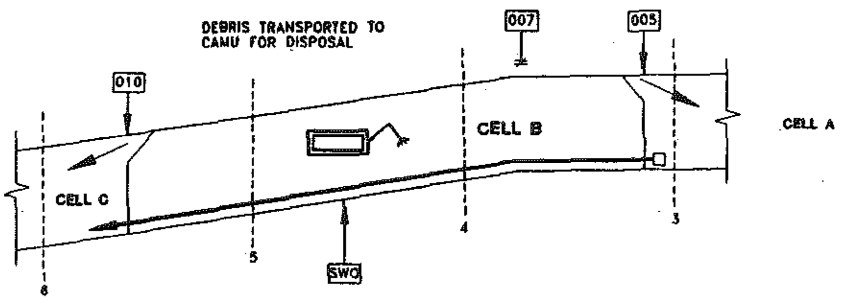
Figure 8



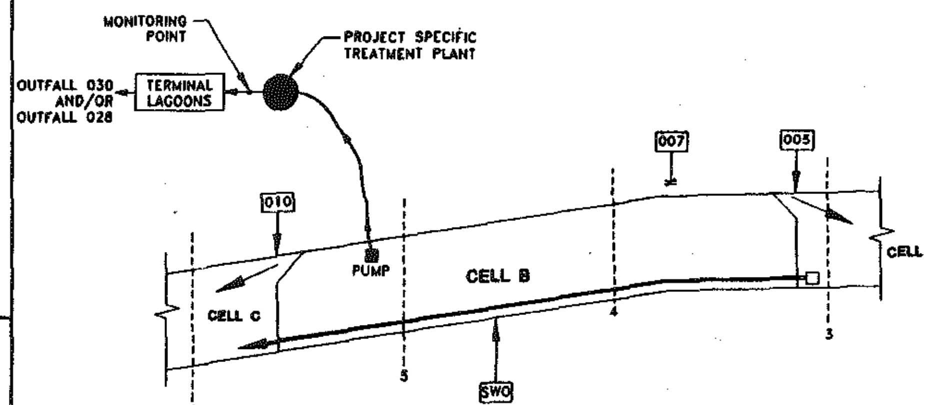
CELL B - ISOLATION



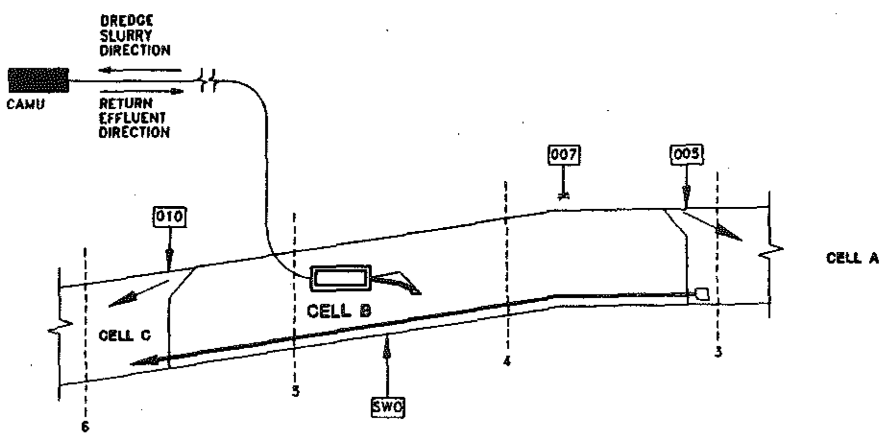
CELL B - SECOND (CLEANUP) PASS WITH HYDRAULIC DREDGE



CELL B - DEBRIS REMOVAL



CELL B - WATER TREATMENT



CELL B - INITIAL PASS WITH HYDRAULIC DREDGE

LEGEND

- TRANSECT LOCATION
- 005 U.S. STEEL OUTFALL LOCATION
- CSO COMBINED SEWER OVERFLOW
- SWO STORMWATER OUTFALL

GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

CELL B ISOLATION AND DREDGING OPERATIONS

United States Steel Corporation
Gary Works

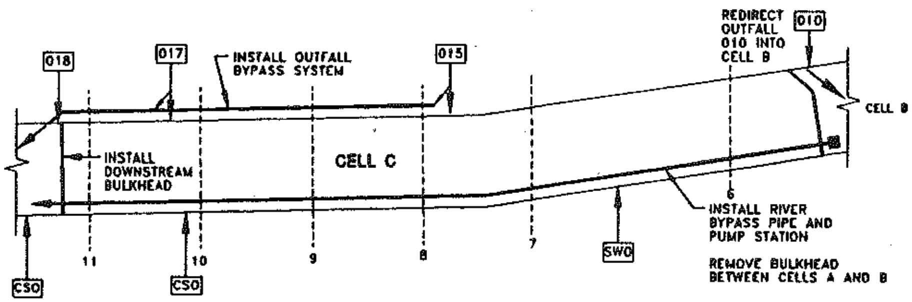
Baker
Baker Environmental Inc.

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
DAD	08/93	JWH	6/93	NONE

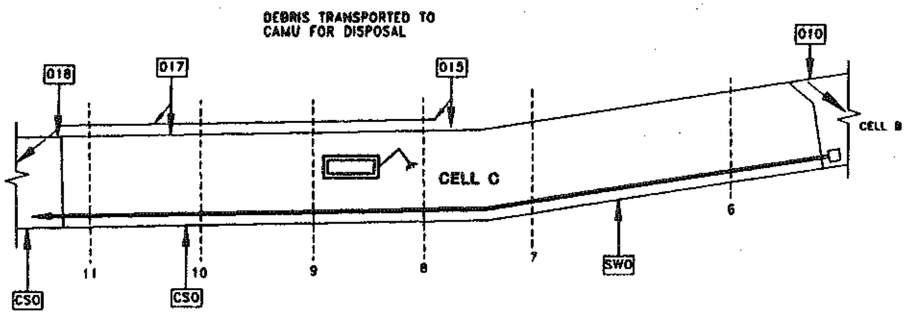
PROJECT NO. 21397
CAD FILE: 21397F61

FIGURE NO. 8

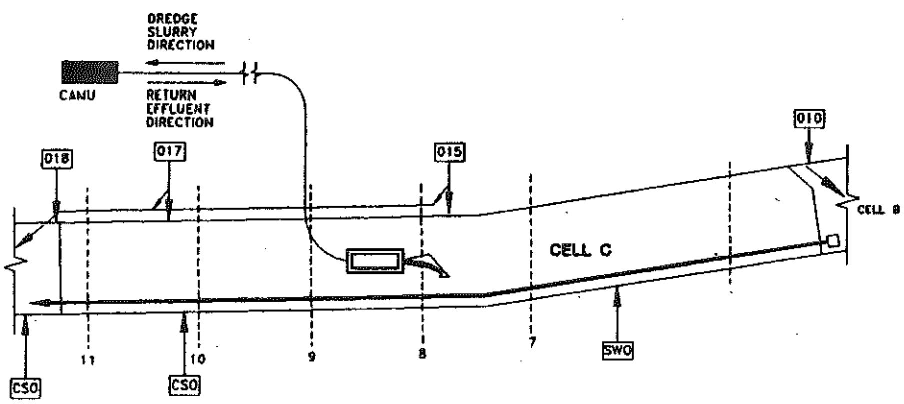
Figure 9



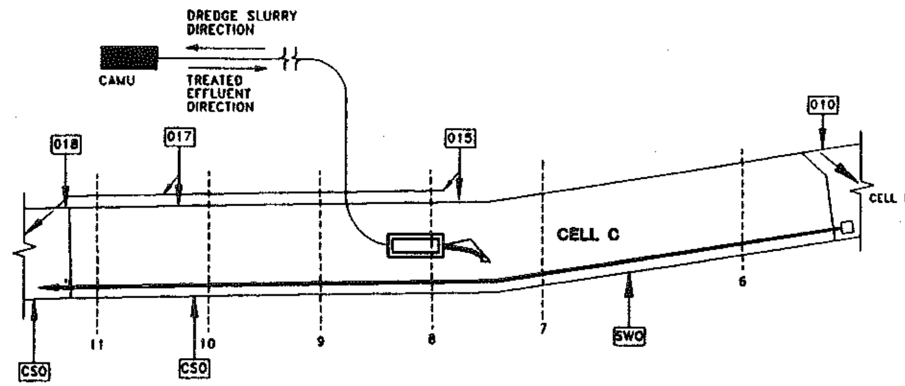
CELL C - ISOLATION



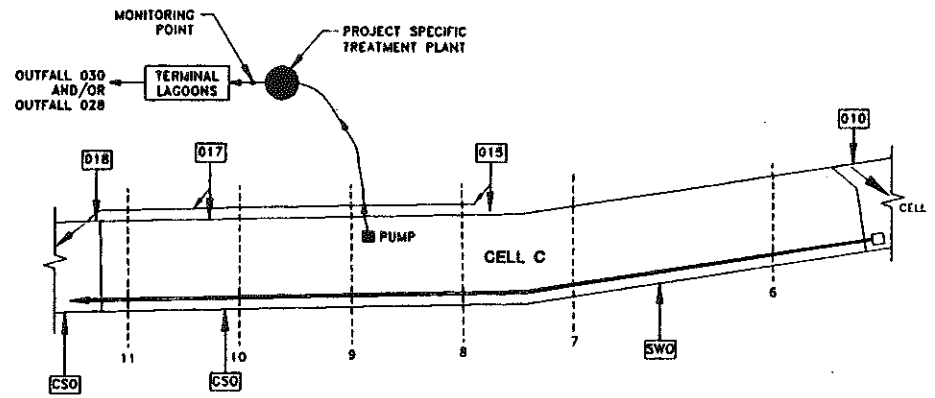
CELL C - DEBRIS REMOVAL



CELL C - INITIAL PASS WITH HYDRAULIC DREDGE



CELL C - SECOND (CLEANUP) PASS WITH HYDRAULIC DREDGE



CELL C - WATER TREATMENT

LEGEND

- TRANSECT LOCATION
- 005 U.S. STEEL OUTFALL LOCATION
- CSO COMBINED SEWER OVERFLOW
- SWO STORMWATER OUTFALL

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GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

CELL C ISOLATION AND
DREDGING OPERATIONS

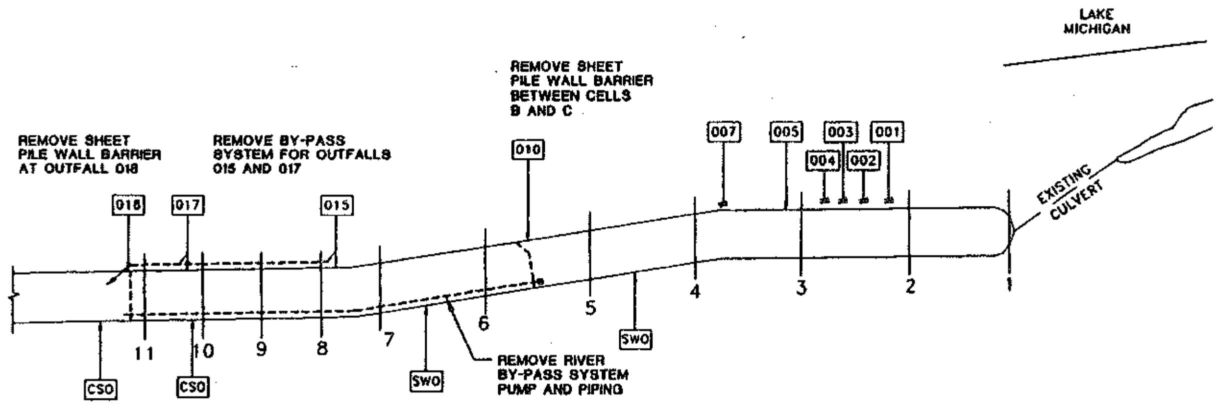
United States Steel Corporation
Gary Works

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
OAB	08/93	JWH	8/95	NONE

PROJECT NO. 21387
CAD FILE: 21397F02

FIGURE NO. 9

Figure 10



RESTORE NORMAL FLOW CONDITIONS

LEGEND

5	TRANSECT LOCATION
005	U.S. STEEL OUTFALL LOCATION
CSO	COMBINED SEWER OVERFLOW
SWO	STORMWATER OUTFALL

GRAND CALUMET RIVER
SEDIMENT REMOVAL PLAN CONCEPT

RESTORE NORMAL FLOW CONDITIONS
TRANSECTS 1 THROUGH 11

United States Steel Corporation
Gary Works

Baker
Baker Environmental, Inc.

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
DAB	12/94	JWH	6/95	NONE

PROJECT NO. 21397
JOB NO. 21397F83

FIGURE NO. 10

For dredging of sediment in Cell C, the temporary bulkhead at Outfall 005 will be removed, the bulkhead at Outfall 010 retained (although flow from Outfall 010 will be directed into former Cell B), and a third bulkhead installed at Outfall 018 (flow from Outfall 018 will be directed downstream of Cell C). Figures 6 through 10 depict the staging plan for dredging of Transects 1 through 11 including the installation and removal of the bulkheads.

A weir section will be integrated in each bulkhead to pass flows from a two-year frequency flood without overtopping the bulkhead. The two-year frequency flood was selected because the total time for dredging of Transects 1 through 11 is estimated to require only a limited time period. Cross sections for the bulkheads are provided on Figures 11 through 13. The cross sections show weir dimensions, elevations for the overtopping sections (weirs) and elevations for the non-overtopping sections. The peak discharges for the two-year flood are based on the City of Gary, Indiana Flood Insurance Study (FIS).

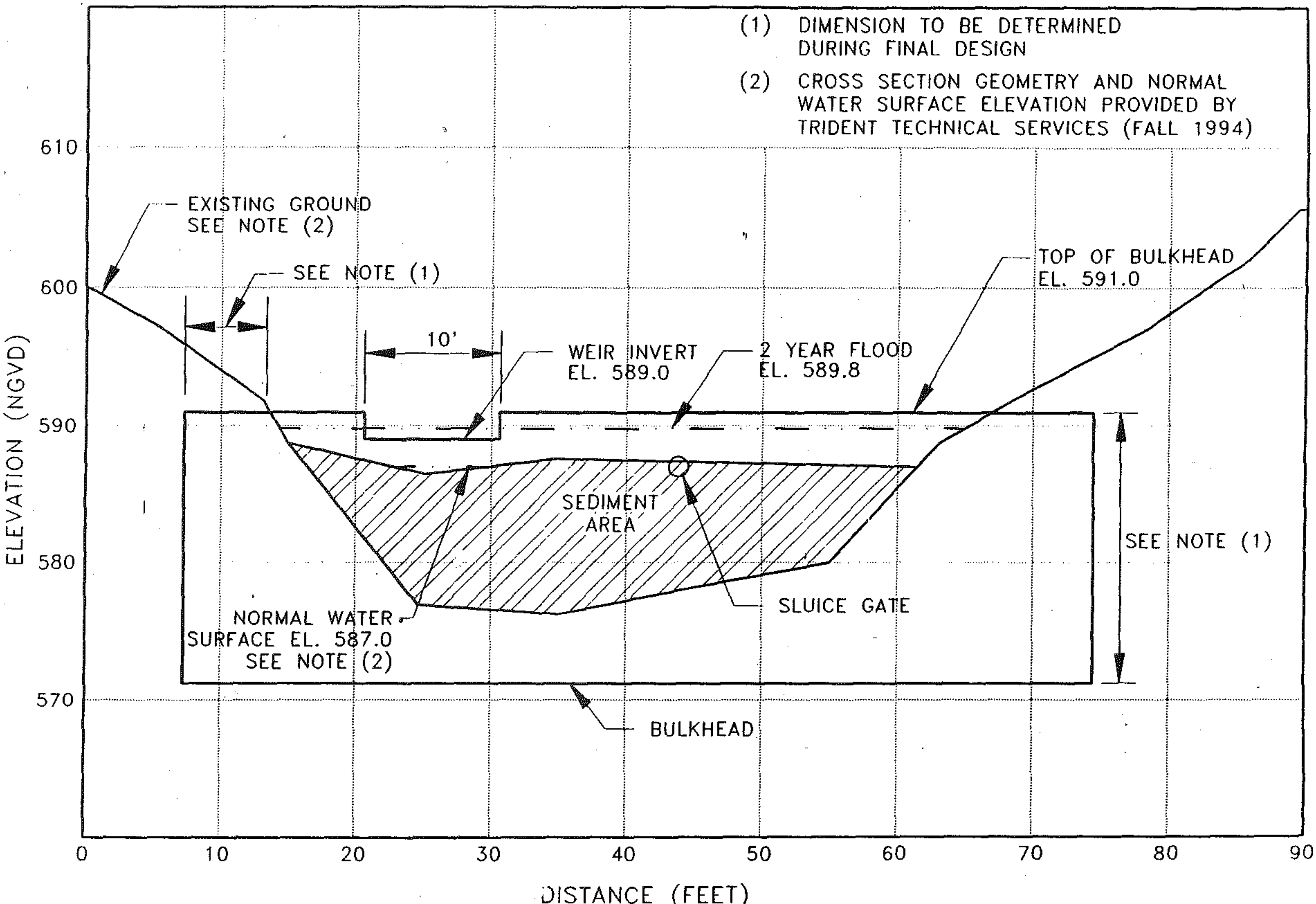
A sluice gate will be incorporated in the bulkheads to allow adjustments in water surface elevations after flood events. The sluice gate will remain closed during dredging operations.

The two-year flood profiles for Cells A, B and C dredging activities are provided on Figures 14 through 16, respectively. Preliminary calculations indicate that the installation of bulkheads with the integral weir sections will result in a maximum increase of approximately two feet in the water surface elevation for the two-year flood.

4.4.1.3 Cell Isolation and River Bypass Systems

With the exception of Cell A, USX shall install river bypass pumping systems to divert flow around an active cell during dredging activities. A bypass system for Cell A is not necessary because the upstream flow from the headwater lagoons will be blocked during dredging activities.

Figure 11



GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

BULKHEAD AT OUTFALL 005

Baker
Baker Environmental, Inc.

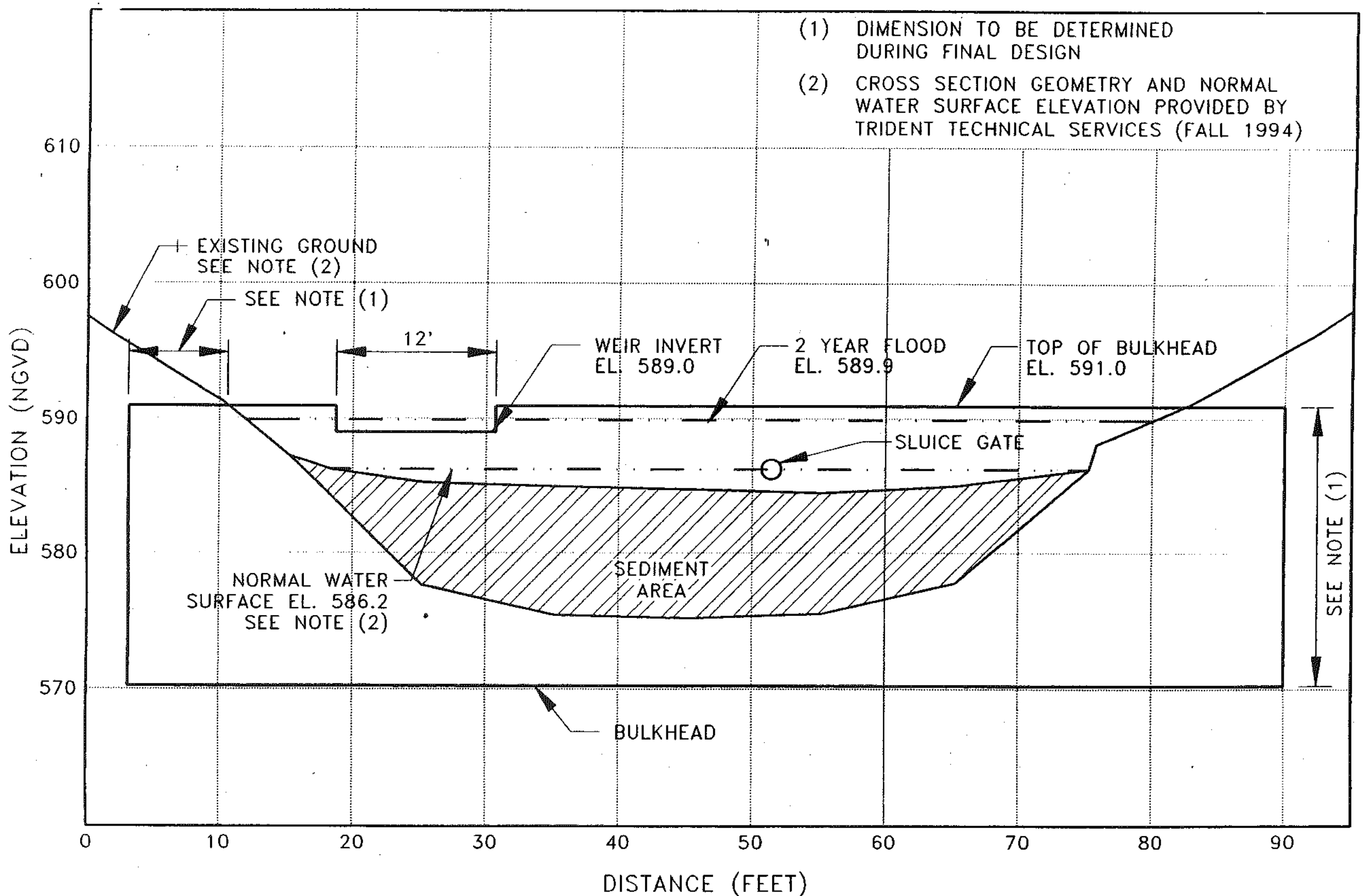
United States Steel Corporation
Gary Works

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	05/95	JWH	06/95	1" = 10'

PROJECT NO. 21397
CAD FILE: 21397X01

FIGURE NO. 11

Figure 12



GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

BULKHEAD AT OUTFALL 010

Baker
Baker Environmental, Inc.

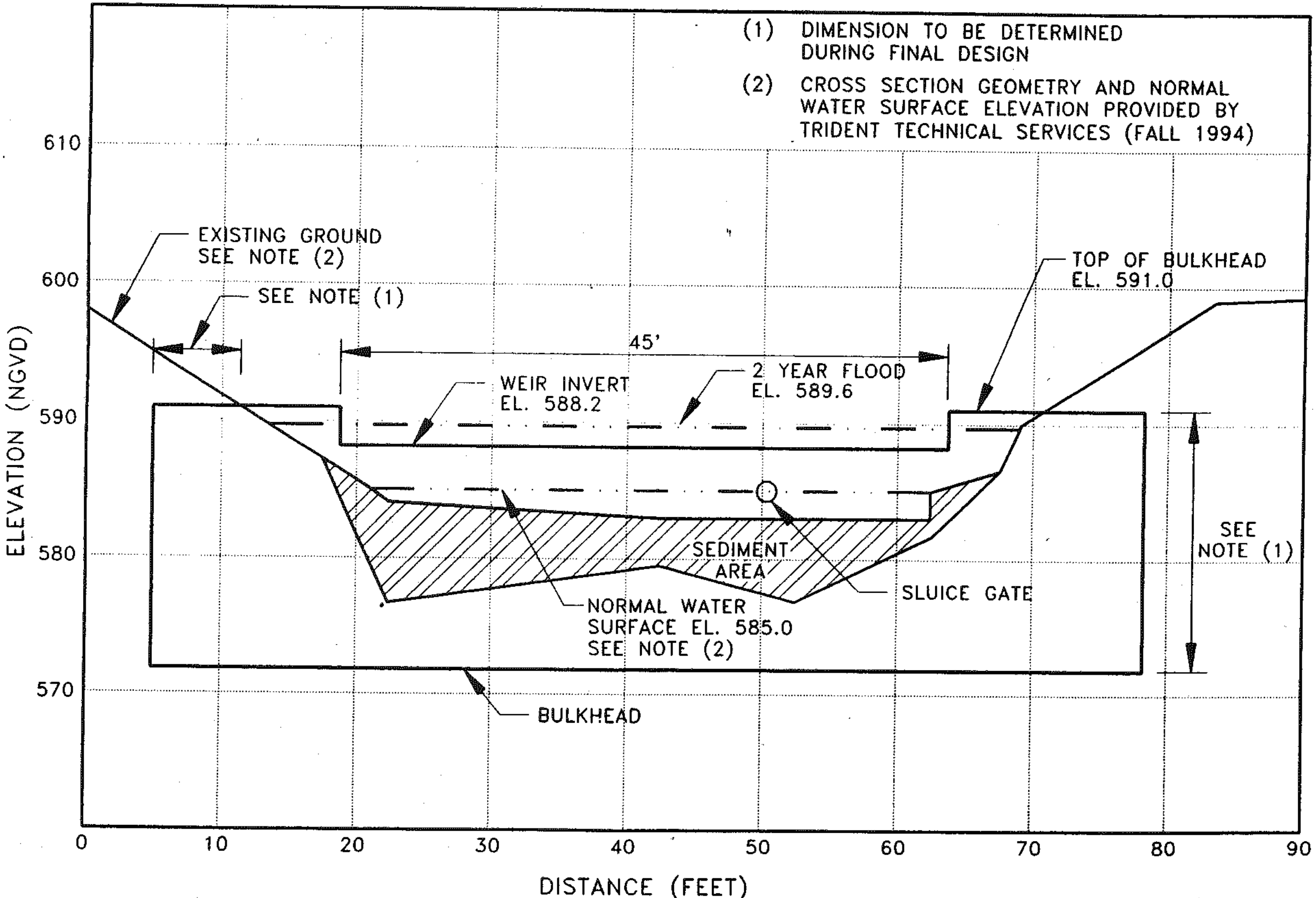
United States Steel Corporation
Gary Works

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	05/95	JWH	06/95	1" = 10'

PROJECT NO. 21397
CAD FILE: 21397X01

FIGURE NO. 12

Figure 13



REVISION 1 - 5/96

GRAND CALUMET RIVER SEDIMENT REMEDIATION PLAN

BULKHEAD AT OUTFALL 018

Baker

Baker Environmental, Inc.

United States Steel Corporation
Gary Works

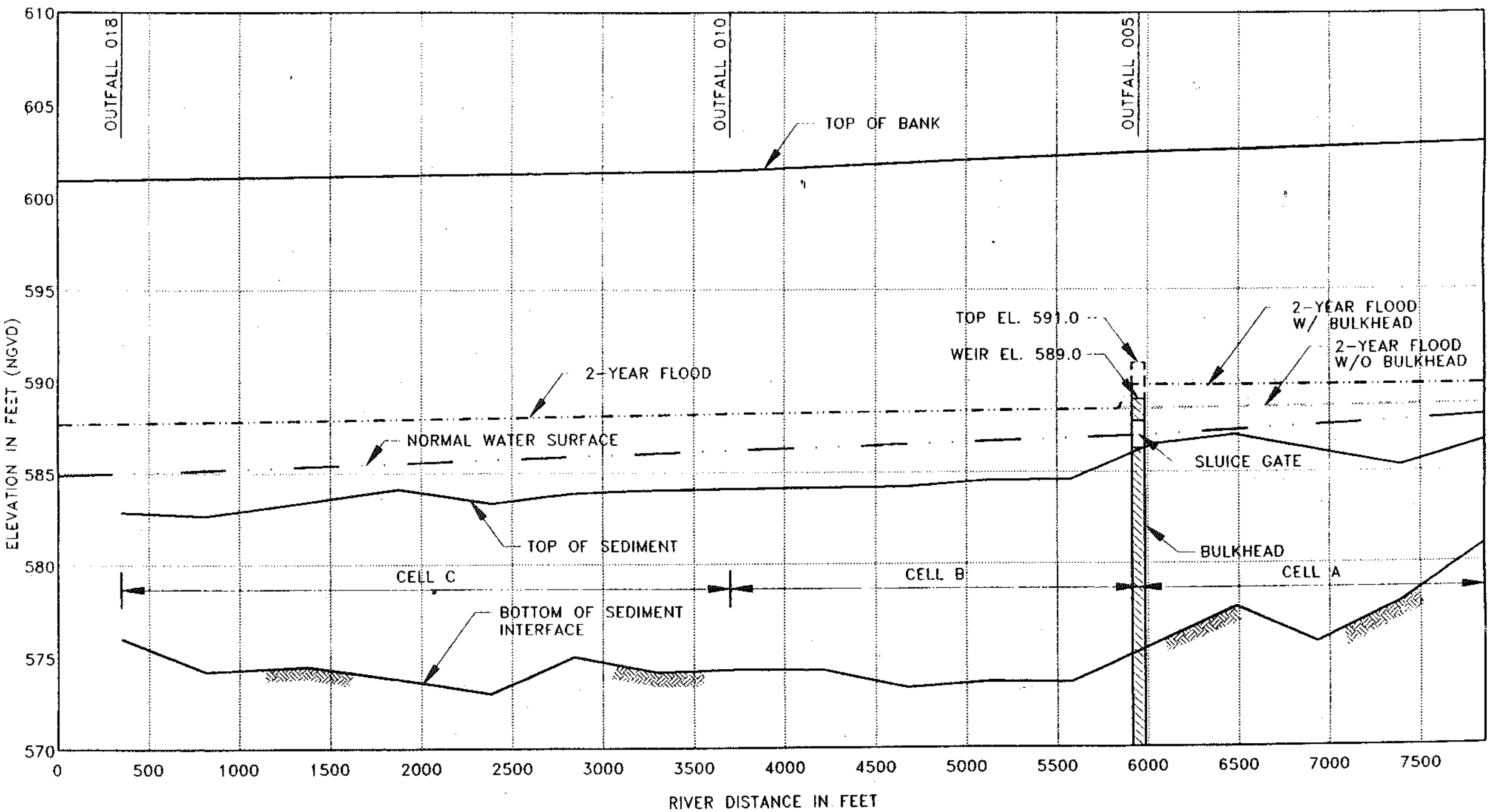
PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	05/95	JWH	06/95	1" = 10'

PROJECT NO. 21397

CAD FILE: 21397X01

FIGURE NO. 13

Figure 14



GRAPHIC SCALE
(IN FEET)

HORIZONTAL: 1 inch = 800 ft.

VERTICAL: 1 inch = 8 ft.

GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

PROFILE FOR CELL A
DREDGING ACTIVITIES

Baker
Baker Environmental, Inc.

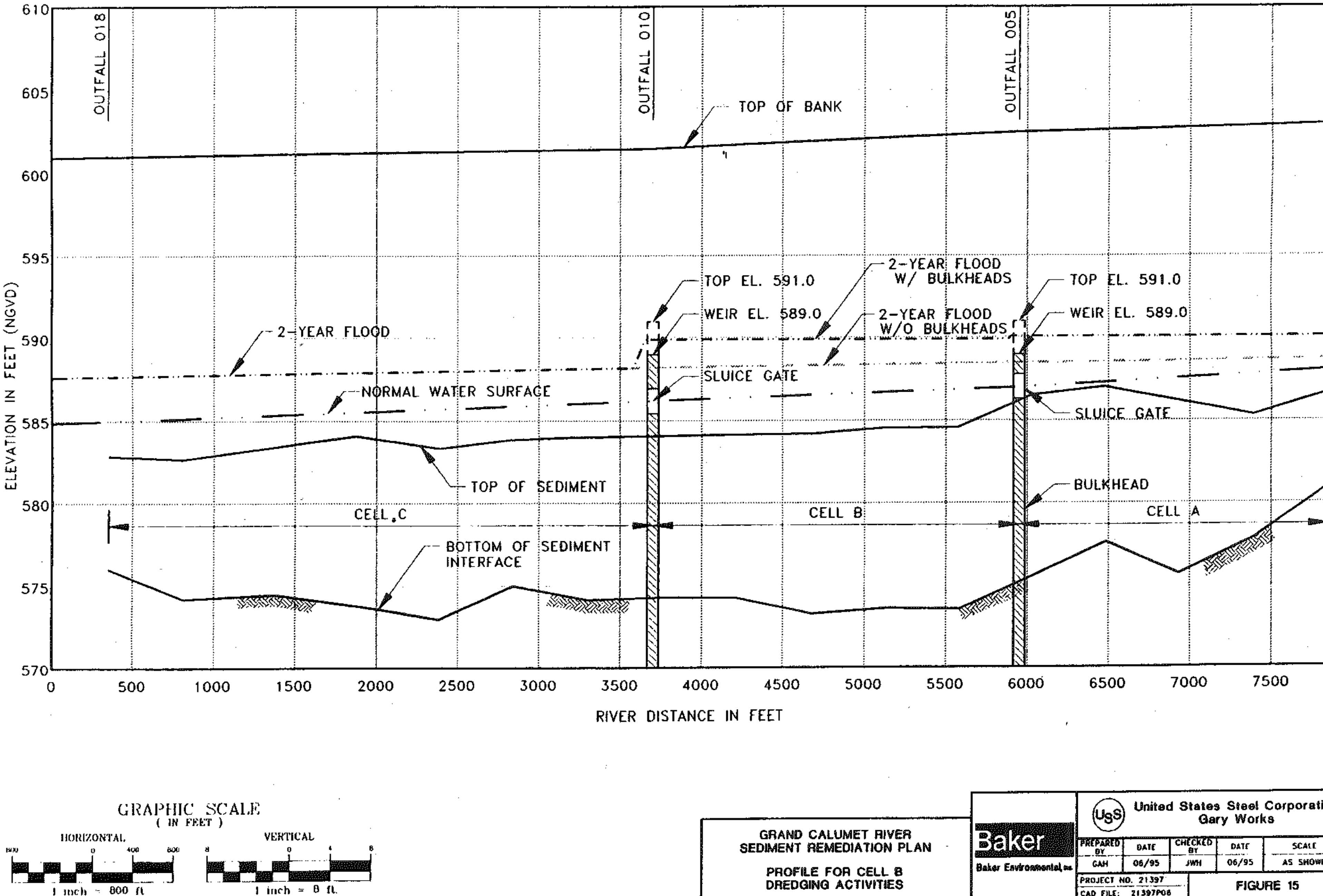
United States Steel Corporation
Gary Works

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	06/95	JWH	06/95	AS SHOWN

PROJECT NO. 21397
CAD FILE: 21397P05

FIGURE 14

Figure 15



GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

PROFILE FOR CELL B
DREDGING ACTIVITIES

Baker
Baker Environmental, Inc.

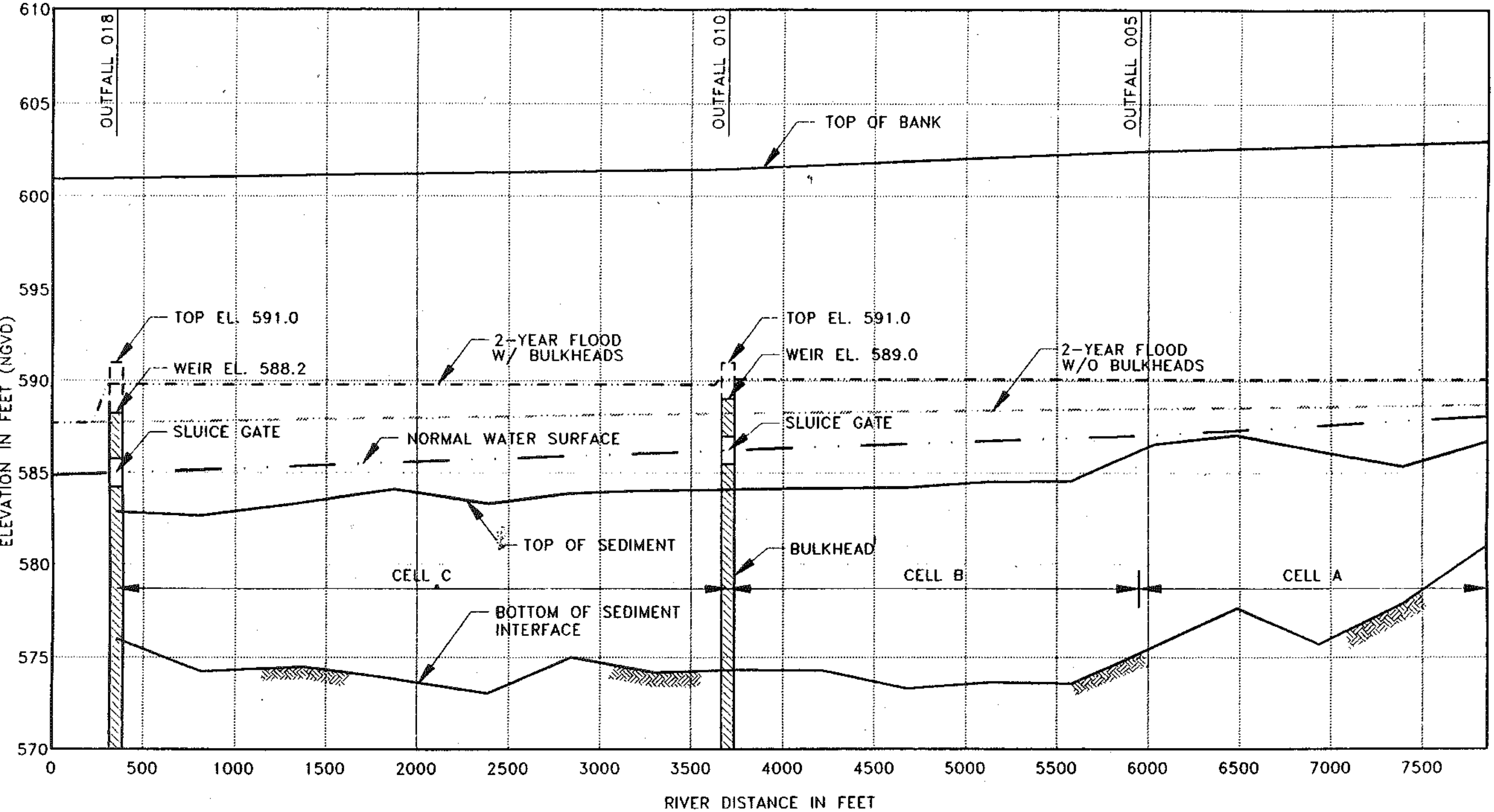
United States Steel Corporation
Gary Works

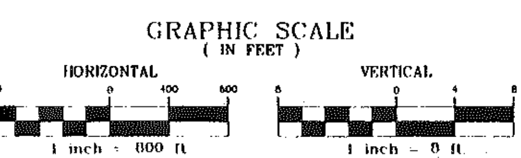
PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	06/95	JWH	06/95	AS SHOWN

PROJECT NO. 21397
CAD FILE: 21397P06

FIGURE 15

Figure 16





GRAND CALUMET RIVER
SEDIMENT REMEDIATION PLAN

PROFILE FOR CELL C
DREDGING ACTIVITIES

Baker
Baker Environmental, Inc.

United States Steel Corporation
Gary Works

PREPARED BY	DATE	CHECKED BY	DATE	SCALE
GAH	06/95	JWH	06/95	AS SHOWN

PROJECT NO. 21397
CAD FILE: 21397P06

FIGURE 16

The systems are designed to bypass the calculated 95 percent upper confidence limit flows recorded during the months of July and August by USX plus flow from a nominal storm event (i.e., 10 percent of the peak discharge from a 2-year storm). July and August typically represent the highest flows during the year for USX Outfalls 005 and 010 due to increased demand for cooling water. Given the reserve capacity of the individual cells, they will provide storage if the design flows are occasionally exceeded. USX shall cease dredging operations when the weir on either end of the cell is about to be overtopped. During the period when dredging operations have been halted due to overtopping, the sluice gates will be opened as necessary to accelerate the return to normal water levels and to allow dredging operations to resume as quickly as possible. Dredging will be suspended during any period in which water overtops the weirs. Additional oil booms and silt curtains will be deployed immediately downstream of the weirs to contain any oil and silt releases.

The river bypass systems will include interception of USX Gary Works outfalls which normally flow into the active cells. When the sediment dredging program commences, it is expected that the only active outfalls requiring interception will be Outfalls 015 and 017. Each outfall will be blocked in line, temporary submersible electric pumps installed and the discharge directed from the nearest upstream manhole into a temporary common header collection pipe. This collection pipe will discharge downstream of the active dredge cell.

Descriptions of the systems to be installed for Cells A, B and C are provided below.

Cell A:

Dredging of Cell A will include debris removal, two dredge "passes", cell water treatment, monitoring for residual PCBs, and dredging of residual PCB "hot-spots" as necessary. Cell A will be isolated from the GCR as follows:

- Installation of bulkheads (e.g., sluice gates) on the inlets (or outlets) of the twin 36-inch diameter headwater culverts. This will completely block flow during the period required for dredging of sediment from Cell A. An analysis indicates that impounding runoff from a 2-year, 24-hour storm event would only result in a rise of approximately 8 inches in the headwaters lagoons. For the time of year that the work is to be performed, a more probable rise is approximately 2-3 inches based on average precipitation conditions.

- Installation of a bulkhead across the GCR just upstream of Outfall 005.

- Diversion of flow (approximately 0.9 cfs) from USX Outfalls 001, 003 and 004. (Note: Outfall 002 already has been sealed).

Currently, USX Outfalls 001, 003 and 004 discharge to the GCR within Cell A. However, these discharges will be halted (except for emergencies) and flow will be permanently diverted to Outfall 005 or 010 as part of an NPDES agreement with IDEM. The diversions will be completed prior to initiation of the dredging program.

There are no other outfalls (i.e., process, stormwater, or Combined Sewer Overflow [CSO]) to the GCR within the limits of Cell A or in the headwater lagoons. Stormwater runoff due to sheet flow into Cell A should be insignificant and becomes part of the cell isolation water.

At the conclusion of the sediment dredging and cell water treatment, USX shall sample residual levels of PCBs and remove PCB hot-spots as necessary. At the conclusion of these activities, the bulkheads at the head end of the cell will be opened to pass headwater flow into the GCR.

Cell B:

Dredging of Cell B will include debris removal, two dredge "passes", cell water treatment, monitoring for residual PCBs, and dredging of residual PCB "hot-spots", as necessary. Cell B will be isolated from the GCR as follows:

- A floating barge with bypass pumps will be installed in Cell A.

- Installation of a bulkhead across the GCR just upstream of Outfall 010.

- Adjustment of the bulkhead at Outfall 005 to redirect the discharge from Outfall 005 upstream into Cell A.

Except for Outfall 005, there are no other process outfalls or CSOs discharging to the GCR within the limits of Cell B. Former USX Outfall 007 previously has been sealed and flow diverted to Outfalls 005 and 010. Stormwater runoff due to sheet flow into Cell B and from a the Great Lakes Industrial Center storm sewer, located along the south side of the GCR, should be insignificant and becomes part of the cell isolation water.

It is anticipated that the design capacity of the bypass system will be approximately 75 million gallons per day (mgd) or 116 cubic feet per second (cfs). The dry weather flow consists of USX Outfalls 001, 003, 004 and 005 and headwaters flow. The required capacity for Cell B is approximately 72 mgd or 111.5 cfs.

Three vertical, mixed-flow pumps, with 300-HP electric motors, will be mounted in a floating barge in Cell A next to the bulkhead at Outfall 005. Normally, two pumps will be operating with one on standby. Bypass piping, consisting of two 36-inch HDPE (SDR40) pipelines will be placed over the bulkheads at the upstream (at Outfall 005) and downstream ends (at Outfall 010) and floated through Cell B. During dredging operations, the floating bypass pipes will be positioned on the opposing side of the river to permit access for the dredge.

At the conclusion of dredging and cell water treatment, USX shall sample residual levels of PCBs and remove PCB "hot-spots" as necessary. At the conclusion of these activities, the sluice gates in the bulkheads will be opened to restore the water level in the cell.

Cell C:

Dredging of Cell C will include debris removal, two dredge "passes", cell water treatment, monitoring for residual PCBs and dredging of residual PCB "hot-spots", as necessary. Cell C will be isolated from the GCR as follows:

- Removal of the bulkhead at Outfall 005.

- Installation of a bulkhead across the GCR just upstream of Outfall 018.

- The floating barge with bypass pumps will be relocated to Cell B adjacent to the bulkhead at Outfall 010. The required capacity of the bypass system for Cell C is approximately 74.5 mgd or 115.2 cfs.

- The two 36-inch bypass pipes will be relocated and placed over the bulkheads at the upstream (at Outfall

010) and downstream ends (at Outfall 018) and floated through Cell C.

- Adjustment of the bulkhead at Outfall 010 to redirect the discharge from Outfall 010 upstream into Cell B.

- A temporary outfall bypass system for Outfalls 015 and 017 will be installed to divert these flows downstream of the bulkhead at Outfall 018.

The bypass system for Cell C will be sized to convey the anticipated dry weather flow estimated for Cell B, discharge from Outfall 010 and runoff from a nominal storm event.

In addition to process Outfalls 015 and 017, other outfalls are located along the south bank of the GCR within the limits of Cell C. These outfalls consist of a stormwater sewer from the Great Lakes Industrial Center and a 132-inch CSO (i.e., Rhode Island Street Regulator) from the Gary Sanitary District (GSD). In addition a 96-inch CSO is located just downstream of Cell C. Stormwater runoff due to sheet flow into Cell C and from a storm sewer serving the Great Lakes Industrial Center should be insignificant and will become part of the cell isolation water. Stormwater flow from the two CSOs can be significant, (approximately 245 cfs for a two-year flood). Since the City of Gary FIS did not differentiate flows between the two CSOs, it was assumed that all stormwater outlets through the 132-inch outfall for the river profile and weir sizing calculations.

As for Cells A and B, when the upstream or downstream weirs are about to be overtopped, dredging will halt until the overflow condition ceases.

At the conclusion of dredging and cell water treatment, USX shall sample residual levels of PCBs and remove PCB "hot-spots" as necessary. At the conclusion of these activities, the sluice gates in the bulkheads will be opened to restore the water level in the cell.

4.4.1.4 Debris and Oil Removal During Dredging in GCR

Debris and oversized materials will be removed from within the cells by utilizing a barge-mounted backhoe fitted with different attachments (e.g., rake, grapple). Material removed during this operation will be hauled to the CAMU for disposal. Dredging activities are expected to release oils associated with the sediments within each cell. Oils may accumulate on the water surface within each cell; floating oils will be skimmed on an as needed basis and stored temporarily in an oil storage tank. Oil fences or booms will be deployed to intercept oils and greases. Pumps or skimmers will remove the collected oils and greases on an as needed basis and transfer them to temporary storage.

Recovered oils will be tested to determine the appropriate recycling or disposal options. Thereafter, USX shall dispose of or recycle the recovered oils in accordance with 40 CFR 761.60.

4.4.1.5 Sediment Dredging

Two dredge "passes" will be used for the dredging of Transects 1 through 11 sediment. The bulk of the sediment will be removed with a hydraulic dredge during the initial pass. The slurry will be conveyed to the CAMU for primary liquid-solid separation. Effluent waters from the CAMU will be returned during inoperative dredge times to the active containment cell.

The second pass (or cleanup pass) will complete the removal of non-native sediment. It is anticipated that plain suction or use of a slowly rotating cutter-head will be used to "vacuum" the bottom/sides of the channel and minimize re-suspension in the process. As with the initial pass, effluent water from the CAMU will be returned directly to the active cell. However, it is expected that the effluent water will be treated to enhance suspended solids removal in the CAMU.

4.4.1.6 Water Treatment

After the second dredging pass has been completed, the cell water will be treated. The volume of water in the cell following dredging will be processed through a project-specific waste water treatment plant. Treated effluent will be monitored prior to being conveyed to the Terminal Lagoons and returned to the GCR via permitted Outfall 030 and/or Outfall 028.

4.4.1.7 Restore Normal Flow Conditions

Following completion of dredging of sediment from Cell C, activities for restoring normal flow conditions include the following:

- Open sluice gate(s) in bulkheads and restore water level in cell.
- Removal of the bulkhead at Outfall 018.
- Removal of the bulkhead at Outfall 010.
- Removal of Outfall 015 and Outfall 017 bypass systems and restoration of normal discharge.
- Removal of floating pump station and temporary piping.
- Operations required to restore normal flow conditions are shown on Figure 10.

4.4.2 Transects 12 through 36

Dredging of Transects 12 through 36 (i.e., downstream of Cell C) in accordance with the dredging plan (Drawing No. 1) will be performed with a conventional cutter suction hydraulic dredge or a swinging ladder cutter-head hydraulic dredge operating in a conventional manner. Isolation cell construction and flow diversion will not occur downstream of Transect 11. USX shall perform debris removal prior to dredging of any reach.

A slurry pipeline (with booster stations added as necessary as the distance increases) will be used to transport the slurry directly from the hydraulic dredge to the CAMU. The pipeline and barge-mounted booster stations will be floated within the river channel to minimize or eliminate impacts to adjoining properties. The Dredging of Transect 17, Horizon 1 shall precede dredging of the other reaches of the GCR. The dredge slurry from Transect 17, Horizon 1 will be discharged to the discrete disposal cell within the CAMU with the sediment dredged from Transects 1-11 because of the nature of the sediments in these transects.

Shore-based access and launching facilities for the dredge and debris removal/equipment barges will be located on USX property at Gary Works. It is anticipated that up to three different areas, none located west of Buchanan Street, will be used for temporary access to the river. Since none of these areas will be located near delineated wetlands, the access/launch facilities will have negligible impact on the wetlands.

4.5 Mitigation of Resuspended Materials

Proper use of a conventional cutter-head dredge (and particularly that of a dredge operating in a plain suction mode or with a slowly turning cutter-head) has been demonstrated by the USACE and EPA to result in minimal re-suspension of sediments. USX shall confine the dredge to the river channel to minimize or eliminate potential impacts to wetlands beyond that incurred by the dredging operations.

USX shall take all practicable measures to minimize downstream migration of resuspended materials during dredging operations. These measures are described below.

4.5.1 Isolation Cells with Flow Diversion

USX shall conduct the dredging of Transects 1-11 such that the downstream effects from resuspended material during dredging of Transects 1 through 11 will be negligible. Resuspended material will be contained within three river isolation cells created by placing bulkheads upstream and downstream of each cell.

River flow, outfall discharges and provision for some stormwater runoff will be diverted around each cell during dredging. Each river isolation cell will not be dismantled until dredging and water treatment are complete and suspended material has been removed from the cell water.

4.5.2 Floating Booms and Silt Curtains

During dredging operations below Transect 11, debris booms will be deployed in such a manner as to collect floating materials released from dredging. Collected materials will be retrieved and the booms serviced on an as-needed basis. Oil fences or booms will be deployed downstream of the debris booms at approximately right angles to the river centerline to intercept oils and greases. Pumps or skimmers will remove the collected oils and greases on an as needed basis and transfer them to temporary storage. USX shall collect, store, and recycle or dispose of the collected oil in accordance with 40 CFR § 761.60 and applicable State regulations.

Silt curtains that hang vertically from surface flotation will be installed across the GCR at appropriate locations to intercept resuspended materials.

The booms and silt curtains will be re-positioned as dredging proceeds downstream.

4.5.3 Redistribution of Channel Material After Dredging

Over time, the channel is expected to stabilize and re-suspension of material should occur only during storm events, comparable to natural conditions. Dredging operations shall be conducted in a manner that will not leave steep mounds and deep pools. As shown in Figures 17 and 18, a 10(h):1(v) slope will be utilized to transition the channel bottom from the dredged to non-dredged area at Transect 36. This will provide a gradual bottom transition that should minimize re-suspension of material and aid channel stabilization after dredging.

4.5.4 Water

Hydraulic dredging will result in substantial quantities (e.g., 85-90 percent by weight) of free liquids accompanying sediments to the CAMU. This water will require treatment prior to discharge, as discussed in Section 5.0.

4.6 Sediment Removal Verification

The removal of non-native GCR sediment from the project area will be verified through pre- and post-dredging surveys. The pre-dredge survey will be used to define the non-native sediment present and serve as the baseline data for post-dredge field surveys to confirm removal of non-native sediment and quantify the volume of sediment removed from specific reaches of the river.

Figure 17

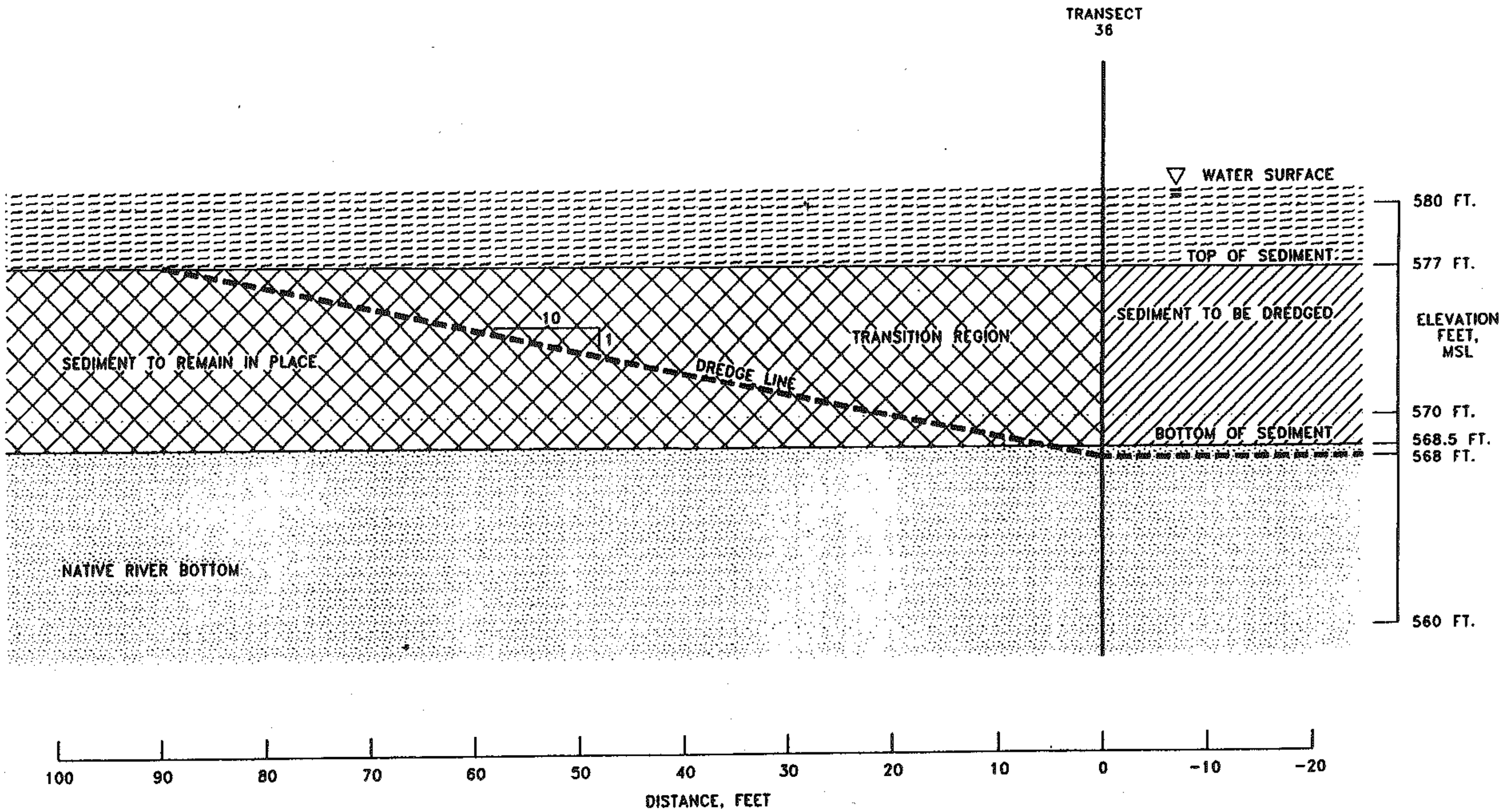


FIGURE 17
GRAND CALUMET RIVER
PRE-DREDGE CENTERLINE PROFILE
TRANSITION REGION AT TRANSECT 36

HORIZONTAL SCALE: 1" = 15'
VERTICAL SCALE: 1" = 7.5'

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Figure 18

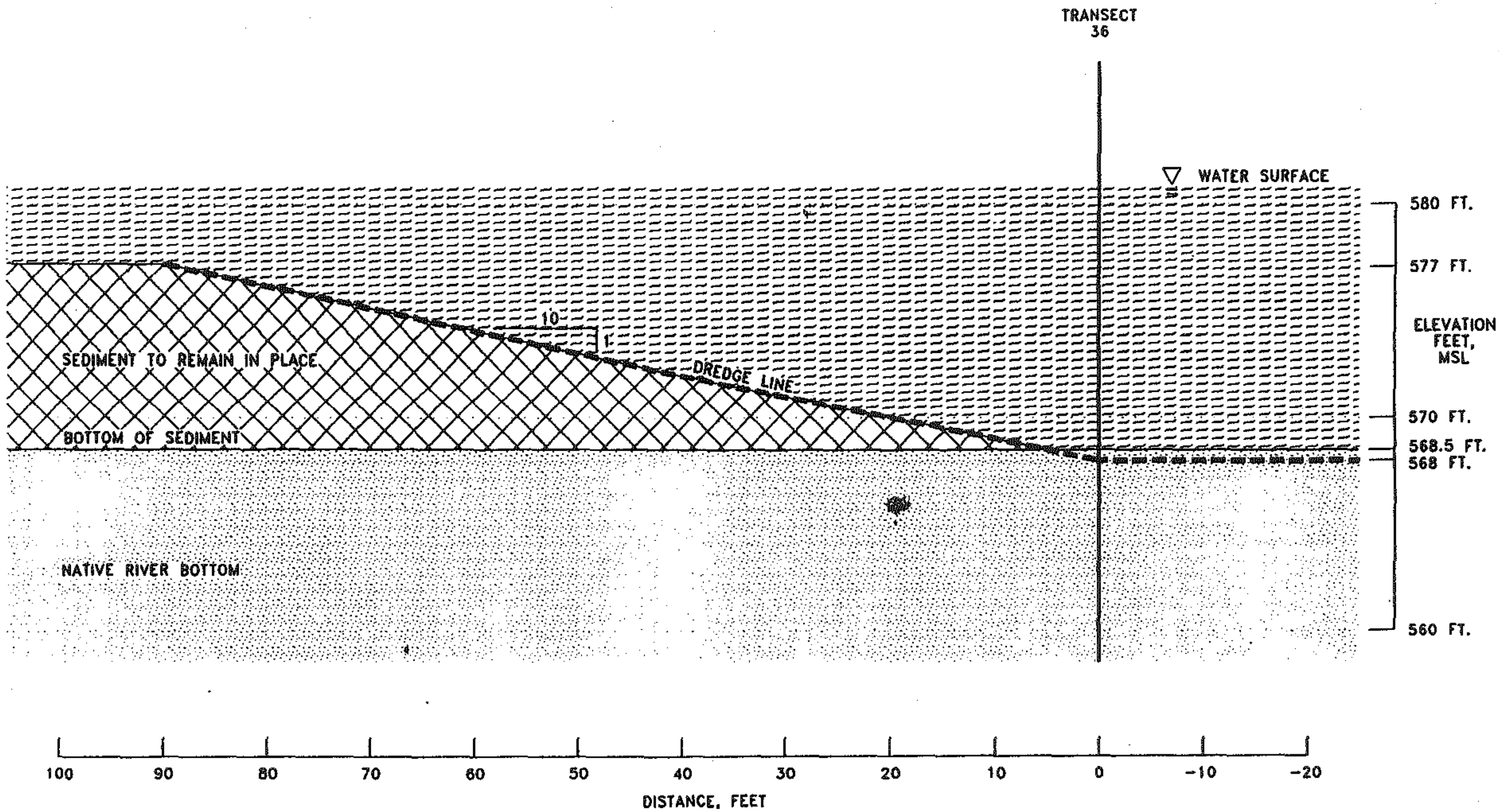


FIGURE 18
GRAND CALUMET RIVER
POST-DREDGE CENTERLINE PROFILE
TRANSITION REGION AT TRANSECT 36

HORIZONTAL SCALE: 1" = 15'
VERTICAL SCALE: 1" = 7.5'

21397F68

4.6.1 Pre-Dredging Surveys

Pre-dredge field surveys of the river channel will be performed no more than 60 days prior to dredging of specific reaches of the GCR. The pre-dredge surveys will establish pre-dredging cross sections (i.e., end area templates), showing the extent of the non-native sediment. In those locations where soft-side sloughing is anticipated, the pre-dredging surveys will be extended an appropriate distance beyond the limits of the river channel to determine the quantity of incidental soft-side sediment removal for dredging contractor payment.

For purposes of this SOW and the subsequent implementation of the SRP, the following equipment, methodologies, and quality assurance/quality control (QA/QC) procedures will be used to delineate the extent of the non-native sediment, as defined in Section 1.0:

- Cross sections will be obtained at 100-foot intervals (i.e., stations) along the river length.

- Elevation measurements to top and bottom of non-native sediment for each cross section will be obtained at a nominal spacing of 10-foot intervals across the river width starting and finishing along the normal wetted perimeter.

- In those locations where soft-side sloughing is anticipated, the limits of the survey will be extended beyond the bank an appropriate distance and elevations of the top of original ground measured at 10-foot intervals.

- All measurements, including surface water elevations, will be referenced to established benchmarks. Benchmark horizontal and vertical controls will be based upon State Plane Coordinate System and National Geodetic Vertical Datum (NGVD).

- Calibrated grade rods fitted with oversize baseplates will be used to define the top of the non-native sediment.

- Sounding probes with top-reading penetrometers will be used to identify the interface between the non-native and native river bottom as defined by the significant increase in resistance to penetration when compared to the non-native sediment.

- A total of 20 vibracores, advanced into the native river bottom to refusal depth, will be used as QA/QC to verify that the interface elevations determined by sounding probe measurements are appropriate.

- The end area of each cross section will be determined as follows:

Plotting the top and bottom sediment elevations to scale similarly to that shown on Figure 1.

Interconnecting the elevation measurements with straight lines forming the end area template as indicated on Figure 1.

Calculating the cross sectional area by graphical methods or via AutoCad.

- The volume of non-native sediment will be calculated using the average-end method (i.e., the average of the end areas of two consecutive cross sections multiplied by the horizontal distance between the two cross sections).

4.6.2 Post-Dredging Surveys

Post-dredge field surveys of the river channel will be performed each time that dredging of a 500-foot section of the GCR has been completed. In addition, in those instances where localized soft-side sloughing is incipient, a more frequent program will be established (e.g., immediately following completion of a section).

USX shall perform the post-dredge surveys similarly to the pre-dredge surveys and will be comprised of the following equipment, methodologies, and quality assurance/quality control (QA/QC) procedures to delineate the post-dredge profile, verify that the non-native sediment has been removed and determine the volume of sediment dredged:

- Cross sections shall be obtained at the same stations (i.e., 100-foot intervals) along the river length as the pre-dredge surveys.

- Elevation measurements to the interface (i.e., the top of native sediment for each cross section) using calibrated grade rods will be obtained at nominal 10-foot intervals across the river width starting and finishing along the normal wetted perimeter.

- In those locations where pre-dredge original ground surface elevation measurements were made and soft-side sloughing may have occurred during dredging, the limits of the post-dredging survey will be extended beyond the bank an appropriate distance and top of ground elevations will be measured at 10-foot intervals.

- All measurements, including surface water elevations, will be referenced to established benchmarks. Benchmark horizontal and vertical controls will be based upon State Plane Coordinate System and National Geodetic Vertical Datum (NGVD).

- Plotting the data to scale to form a post-dredge template similar to that shown on Figure 1 and superimposing it over the pre-dredge template.

- To verify that the non-native sediment has been removed, the post-dredge template will be superimposed over the pre-dredge template to determine that the boundary of the post-dredge template equals or exceeds (lies outboard of) the pre-dredge template.

- The volume of sediment removed will be calculated as the difference in the pre- and post-dredge surveys using the average-end method (i.e., the average of the cross sectional areas of two consecutive cross section end areas multiplied by the horizontal distance between the cross sections).

4.6.3 Sediment Removal Verification Acceptance Criteria

The goal of the dredging program is to remove the non-native sediment. Over-dredging, while not a requirement, may occur and any that does occur will be incidental to the process of removing the non-native sediment. Similarly, dredging of soft-side areas adjacent to the river channel may occur but is not a requirement of the program. Any sloughing of soft-side areas that may occur will be incidental to the process of removing the non-native sediment.

The acceptance/rejection criteria for completion of the dredging program for any reach of the GCR will be based on comparison of the pre- and post-dredge surveys. The criterion for acceptance will be removal of the non-native sediment. This will be verified by comparing the post-dredge with the pre-dredge templates for the same station. The dredging program will be complete and accepted if the post-dredge template shows that the non-native material has been removed from each cross section. USX shall prepare and submit a summary of all the dredging activities, volume/sediment verification studies and findings, to EPA within 90 days of the completion of the GCR dredging activities.

5.0 DREDGED SEDIMENT WASTEWATER AND LEACHATE TREATMENT

5.1 Engineering and Design

USX shall conduct treatability testing, studies and investigations described in Section 2.2 et seq., to help determine equipment selection and the final design for the water treatment facilities for the project. A Water Treatment Investigation Report shall be prepared in conjunction with these efforts and in support of the NPDES permit modification process. The final wastewater treatment requirements ultimately will be set forth in Gary Works NPDES permit modification issued by IDEM.

5.2 Water Treatment Program

Because of the varying characteristics of sediments in the GCR and various methods to be used to remove sediments, USX will propose different levels of treatment for dredge waters. Wastewater generated during sediment removal and primary solids-liquids separation for Transects 1 through 36 will be treated to control suspended solids, and oil and grease. In addition, waters originating from Transects 1 through 11, as well as Transect 17, Horizon 1 will be treated for organics removal.

The conceptual plan for water treatment is set forth in Section 5.2.1 and 5.2.2 below. Detailed programs will be included in the Water Treatment Investigation Report required by Section 2.0 herein. As specified in Section 2.2, final effluent monitoring requirements will be established through modification of the NPDES permit.

5.2.1 Transects 1 through 11

USX proposes that dredged sediment from Transects 1 through 11 will be passively dewatered within a discrete disposal cell in the CAMU. During sediment removal operations in each GCR isolation cell, effluent water from the discrete disposal cell in the CAMU will be returned to the active isolation cell following oil and grease removal. During the second (cleanup) pass, the CAMU disposal cell effluent also will be treated for removal of suspended solids prior to return to the isolation cell. The nature and extent of this treatment will be defined during final design. Once the non-native sediment has been removed from each isolation cell, a volume of water equal to the volume of water in the cell following completion of dredging will be processed through the project-specific water treatment facility, monitored for pollutants and other constituents and pumped to the on-site Terminal Lagoons for discharge to the GCR in accordance with the IDEM approved NPDES modification for Outfall 030 and for 028.

A process flow diagram of the proposed project-specific treatment plant is provided in Figure 19. Conceptually, the proposed treatment plant consists of the following unit operations:

- <u>Grit Chamber/Surge Tank</u>
  The purpose of the grit chamber/surge tank is to remove large solids from the flow stream and ensure a uniform flow of water to the treatment process.

- <u>Flocculation</u>

  If required based on the results of bench-scale testing and/or alternatives evaluation preceding final design, a flocculation agent (e.g., polyelectrolyte, coagulant and/or surfactant) shall be added to the influent water to enhance clarification/sedimentation of solids.

- <u>Clarification</u>

  Suspended solids (and agglomerated particle flocs) will be removed from the cell water via clarification. Effluent from clarification will be directed to the activated carbon units for organics removal. The underflow solids will be directed to the CAMU for disposal. The size and type of unit will be selected following bench-scale testing and/or evaluation of alternatives preceding final design.

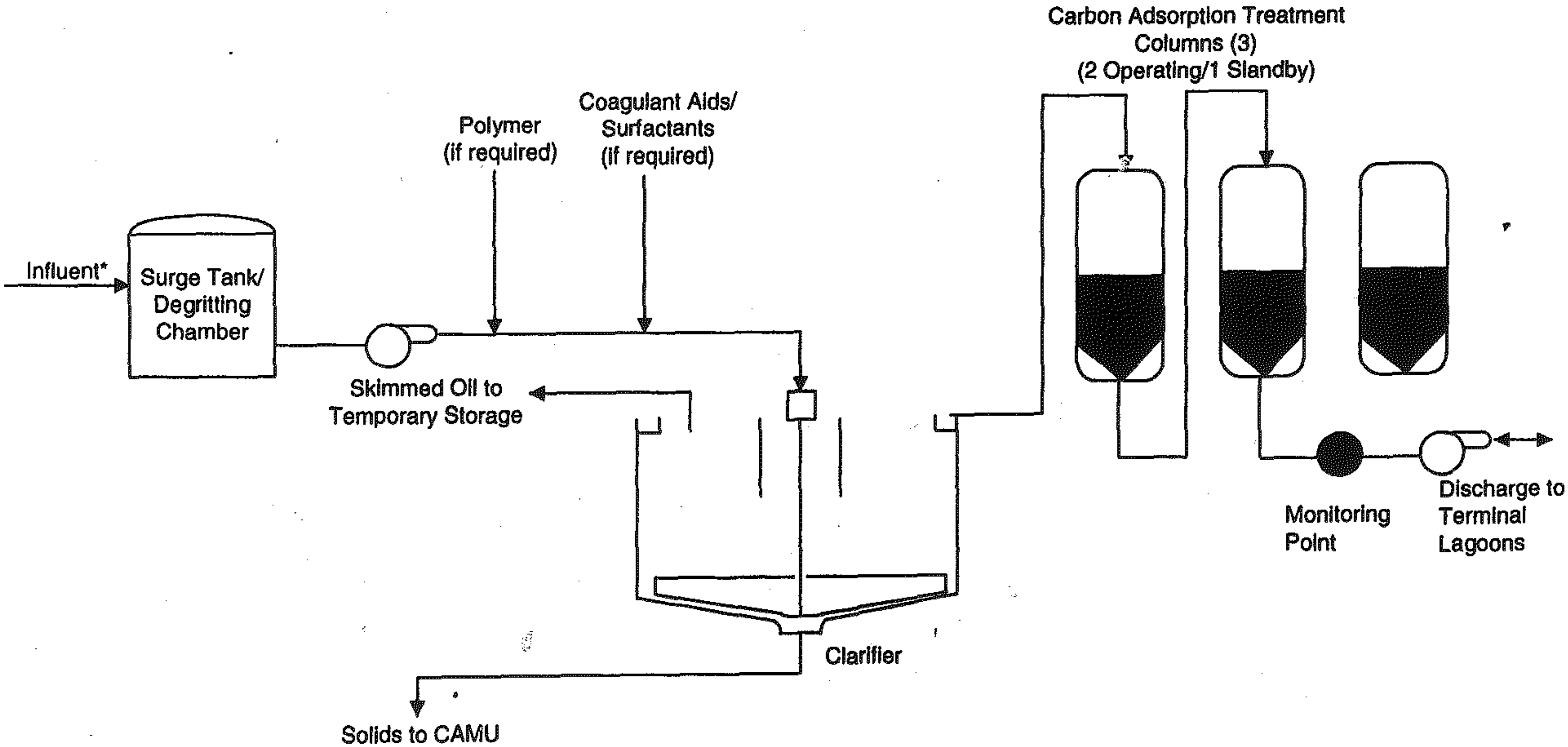
- <u>Carbon Adsorption</u>

  A carbon adsorption system will be used to remove organics. Two carbon columns operating in series, with a third column on standby, will comprise the system. The treated water will be monitored and subsequently conveyed to the Terminal Lagoons and discharged to the GCR via permitted NPDES Outfall 030 and/or Outfall 028. Spent carbon will be regenerated, disposed off site or disposed in the CAMU.

It is anticipated that the project-specific treatment plant will be sized to treat isolation cell water at a flow rate of approximately 600 to 800 gallons per minute (gpm).

Following the completion of the cell water treatment, it is planned that the treatment plant capacity will be downsized and the plant "reconfigured" to allow year-round operation for treatment of leachate from both discrete disposal cells within the CAMU. The sources of water for treatment will include the supernatant from the discrete disposal cell and leachate from secondary dewatering operations (e.g., operation of the leachate system and/or wick drains). Unit operations of the downsized treatment plant will consist of those described above for the treatment of cell water.

Figure 19



* Influent sources include:

- Cell water from Isolation Cells A, B and C
- CAMU effluent from discrete disposal cell during dredging of Transect 17, Horizon 1
- Secondary dewatering (e.g., underdrain system and/or wick drains) of both discrete disposal cells within the CAMU.

FIGURE 19
SCHEMATIC DIAGRAM OF PROJECT-SPECIFIC WATER TREATMENT PLANT

5.2.2 Transects 12 through 36

USX proposes that the dredged sediment from Transects 12 through 36 (except for Transect 17, Horizon 1) will be passively dewatered within the main containment cell in the CAMU. During dredging operations, the effluent from the CAMU will be treated for suspended solids and oil and grease removal. Waters from the CAMU will monitored for pollutants and other constituents and if found to be above standards set by the NPDES permit, intercepted and returned for further treatment before being conveyed directly to the Terminal Lagoons for discharge to the GCR through NPDES permitted Outfall 030 and/or Outfall 028. Such waters will be treated in a clarifier as shown in Figure 20. Such waters are subject to such treatment and monitoring as required by a modification to USX's NPDES permit to be processed through the State of Indiana.

Dredged sediment from Transect 17, Horizon 1 will be passively dewatered in the discrete disposal cell in the CAMU. This effluent will be treated through the project-specific water treatment facility, monitored and conveyed to the Terminal Lagoons in a similar manner to Transects 1 through 11.

A schematic flow diagram of the Transects 12 through 36 CAMU effluent treatment program is provided in Figure 20. The size and type of clarifier will be selected based on results of bench-scale testing and evaluation of alternatives preceding final design.

Figure 20

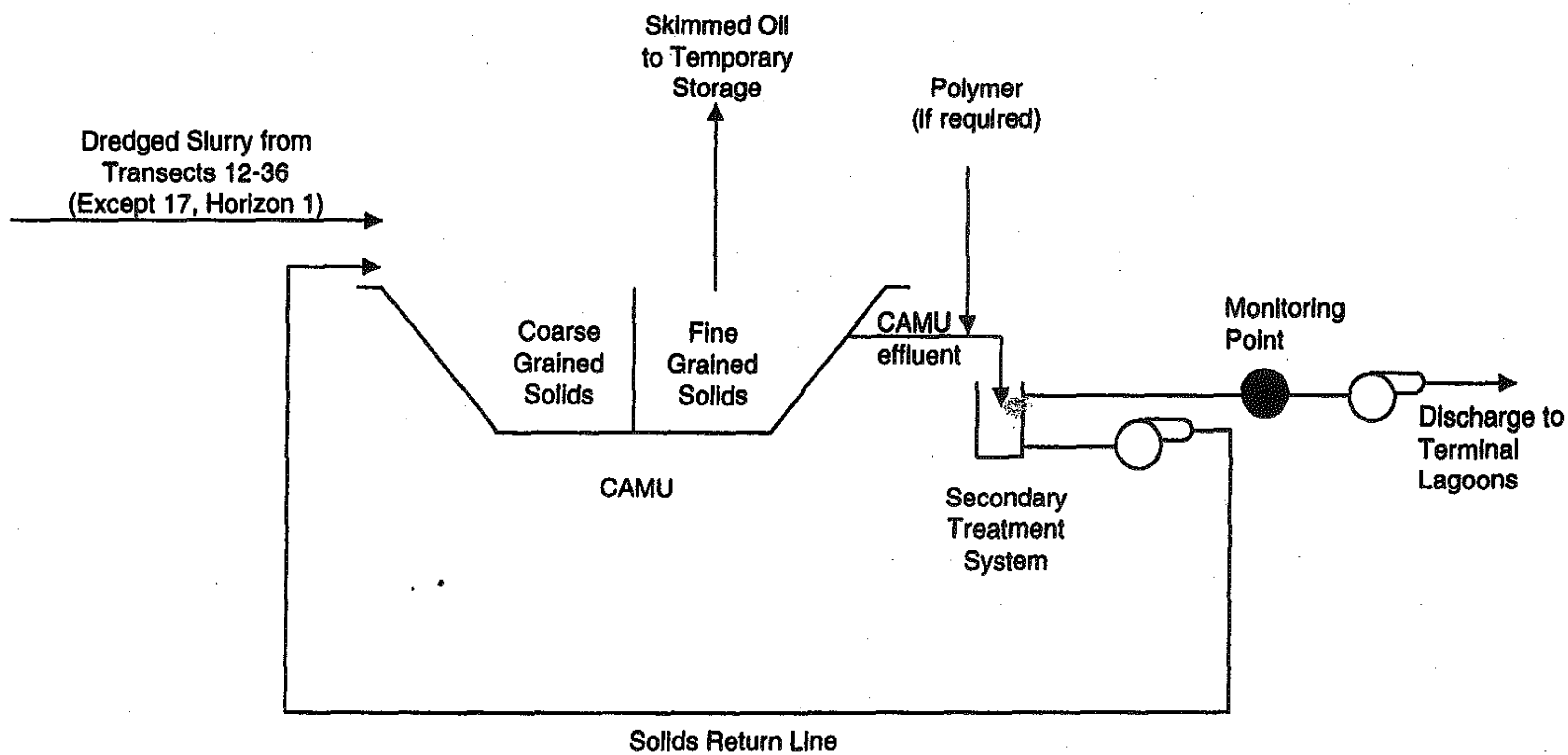


FIGURE 20
SCHEMATIC DIAGRAM OF TRANSECT 12-36 (EXCEPT TRANSECT 17, HORIZON 1)
CAMU EFFLUENT TREATMENT

6.0 CAMU OPERATION

6.1 Sediment Disposal Plan

Operation and maintenance requirements for the CAMU will be set forth in an Operations and Maintenance Plan to be submitted to the EPA for approval as required in Section 2.0, above. The provisions of the plan will include a detailed description of the following activities and the activities set forth in Section 6.2 and 6.3.

Typical CAMU operational tasks will include:

- Periodic movement and re-stationing of the slurry discharge to facilitate sediment passive dewatering and maintenance of ponding depth and freeboard allowance.
- Operation and maintenance of wet-wells, pump stations and conveyance piping.
- Operation and maintenance of collection system drainage piping, overflow discharge weirs and headers.
- Operation and maintenance of the secondary treatment system and project-specific treatment plant.
- Collection and management of floating oils and greases.
- Operation and maintenance of the berms, liner and baffle systems.

- Maintenance of perimeter access roads, site fencing and security features.

- Monitoring and record keeping.

6.2 Operation of the Discrete Disposal Cell for Transects 1 Through 11 and Transect 17, Horizon 1

The dredged sediment from Transects 1 through 11 and Transect 17, Horizon 1 will be conveyed by slurry pipeline and discharged to the CAMU via a submerged outlet equipped with a diffuser. The dredged slurry will be discharged into the CAMU utilizing a pontoon-moored platform that can be re-positioned as necessary inside the containment. The purpose of moving the discharge is to manage the placement of sediment to:

- Achieve surface gradients that will facilitate drainage of supernatant to the overflow discharge weir.

- Allow the selective placement of coarse-grained sediment along the inside faces of the containment berm and fine-grained sediment fraction in the central sections of the cell.

- Maintain the four-foot ponding depth and two-foot freeboard allowances.

- Maximize supernatant residence time and solids settling efficiency by periodically reversing the flow circulation around the baffle system within the cell.

The overflow discharge will be equipped with an adjustable weir to maintain a four-foot ponding depth. The weir overflow will be conveyed to a wet-well equipped with pumps. From the wet-well, the CAMU effluent can be recirculated via closed loop to the active GCR isolation cell, treated for suspended solids removal, or directed to the project-specific treatment plant.

During the initial pass with the hydraulic dredge in the isolation cells, the CAMU effluent will be returned during inoperative dredge times to the active isolation cell. During the second (cleanup) pass, the CAMU effluent will be treated for total suspended solids removal and returned to the active isolation cell. The nature and type of treatment required will be determined based on the results of bench-scale testing and evaluation of alternatives.

Following completion of dredging operations for a specific isolation cell, the four-foot ponding depth will be maintained in place to provide a "water seal" during the treatment phase of the isolation cell water.

Thereafter, the water seal will be decanted and drained from the cell by lowering the adjustable weir and activating the under-drain system. These waters will be processed through the project-specific treatment plant, monitored and conveyed to the

Terminal Lagoons for discharge to the GCR via permitted Outfall 030 and/or Outfall 028. If necessary, to enhance secondary passive dewatering, vertical wick drains shall be installed to accelerate dewatering and associated consolidation of the solids. The method of installation and spacing of the wick drains will be determined during final design of the CAMU.

After completion of dewatering activities, USX shall plant and maintain a temporary vegetative cover over the disposal cell until additional Corrective Action wastes are placed in the cell.

6.3 Operation of the Main Containment Cell for Transects 12 Through 36

Operation of the cell for disposal of dredged sediment from Transects 12 through 36 will be identical to that described above for Transect 1 through 11 and Transect 17, Horizon 1 with the exception of the following:

- The dredged sediment will be conveyed by separate pipeline to the CAMU and discharged into the main containment cell.

- The weir overflow discharge will be directed to a secondary treatment system for the reduction of suspended solids. Effluent from the secondary treatment system will be directed to a wet-well. From the wet-well, the CAMU will be monitored and conveyed directly to the Terminal Lagoons for discharge to the

GCR via permitted Outfall 030 and/or Outfall 028. Sediments removed from the secondary treatment system will be placed in the CAMU.

- Following completion of all dredging operations (i.e., completion of Transects 12 through 36), the supernatant in the cell will be decanted and drained by lowering the adjustable weir and directed to the secondary treatment system, monitored and subsequently conveyed to the Terminal Lagoons for discharge to the GCR via permitted Outfall 030 and/or Outfall 028. Following removal of the supernatant, the under-drain system will be activated. These waters will be processed through the project-specific treatment plant, monitored and conveyed to the Terminal Lagoons for discharge to the GCR via permitted Outfall 030 and/or Outfall 028.

6.4 Oil and Grease Handling and Disposal

Floating oils and greases will be contained within the cell, skimmed and collected as necessary and conveyed to temporary storage for subsequent testing to determine the appropriate recycling or disposal alternatives. USX shall collect, handle and recycle or dispose of all collected oil in accordance with 40 CFR § 761.60. Storage tank design and location will be specified in the final design of the CAMU.

6.5 Closure and Post Closure Plans

Final closure and post-closure plans will be developed and submitted as a component of the Corrective Action program. USX may amend approved plans with U.S. EPA approval. Such plans will meet the requirements of 40 CFR §264.552(e)(4) and 40 CFR 264.310 and shall ensure that the final cover is appropriately vegetated.

6.6 Disposal of RCRA Corrective Action Material

USX may propose to use excess capacity in the CAMU to dispose remediation waste resulting from implementation of an Interim Stabilization Measure, or Corrective Measure as set forth in the RCRA Corrective Action Order. Such use shall be subject to EPA approval. USX shall demonstrate compatibility with the liner material and GCR sediments and shall submit appropriate design documents. Public comment shall be received prior to disposal of remediation wastes into the CAMU in accordance with the Order with respect to any corrective measure, or as otherwise provided by U.S. EPA, with respect to any interim stabilization measure.

7.0 WETLANDS MITIGATION PROGRAM

Unavoidable impacts to approximately 13.6 acres of wetlands spread out along approximately five miles of the GCR will occur as a result of the sediment remediation project. Approximately 0.5 acres will be impacted by direct dredging while approximately 13.1 acres will be impacted indirectly as a result of slumping river banks. An additional 0.2 acres of wetlands at a separate site will be impacted during construction of the CAMU. In total, this project will impact approximately 13.8 acres of wetlands.

To compensate for the unavoidable impacts to this natural resource, USX shall carry out a compensatory mitigation plan which is described in the U.S. Army Corps of Engineers permit issued for the project. Currently USX has proposed the restoration and protection in perpetuity of approximately 32 acres of globally-rare dune and swale habitat within the GCR basin. The 32-acre mitigation site is best described as dune and swale or black oak savanna/marsh habitat. It is located in the southeast corner of Gary Works and is contiguous with the Indiana Dunes National Lakeshore (see Figure 21). A portion is within the Congressionally authorized purchase area of the park, though the entire mitigation site is currently owned by USX. Interspersed throughout the site are several pockets of flooded or saturated wetland totaling approximately 5 acres. While largely undisturbed, the site has been impacted by the clearing and filling of approximately 0.5 acres and the clearing of approximately 0.5 acres during the construction of a railroad spur. Additionally, a one-acre stand of the invasive grass

Phragmites has become established in a wetland on the west end of the parcel. These disturbed areas will be restored as part of the mitigation plan.

Phragmites will be controlled on the site by careful chemical application for up to five years. Special care will be taken to minimize impacts to the existing native vegetation within the wetland. Because Phragmites is substantially taller than the native vegetation, techniques such as "wicking" will be utilized where practical. Wicking involves dragging a wick saturated with herbicide across the taller target plant. In this way, the shorter native vegetation is unaffected.

It is expected that this technique will be supplemented by spraying in areas where the Phragmites has developed as a monoculture and by manual removal of rhizomes. Elimination of the Phragmites will result in the restoration of approximately one acre of wetland.

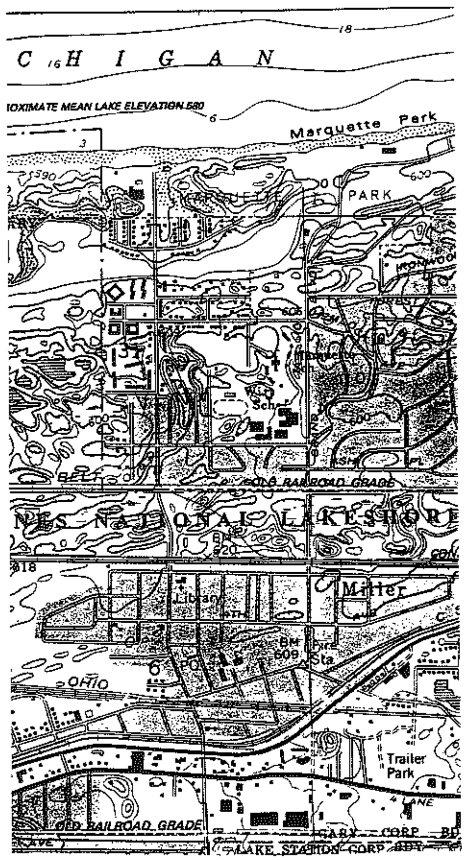
The 0.5 acres of fill will be removed and properly disposed of at an upland site. The disturbed area will then be regraded to a natural contour and planted with native, local genotypes. The importance of using only local genotypes cannot be overstated. Dune land habitats are characterized by a fairly unique set of environmental characteristics which have driven the evolution of the local species. To meet this need for local genotypes, seeds will be collected locally and propagated in a nursery setting for later planting on site. Where possible, seed collecting will be done on the mitigation site, although collecting may also be done in similar habitats in the local dune land region. An addition 0.5 acres of land adjacent to the northern railroad track at the east end of the mitigation site was disturbed during construction on the line. This area will also be planted with appropriate species of plants of local genotypes.

To ensure that the disturbed areas are successfully restored, the site will be monitored and managed by USX for a period of five years. The focus of the management plan is annual burning of the site. Burning is essential to ensure the continued maintenance and improvement of the native community. Incidental occurrence of windblown trash present on the site will be collected and disposed of appropriately. Any exotic species found on the site within the five-year monitoring period will also be removed.

The compensatory mitigation plan will begin in the spring of the year following EPA approval of the Wetlands Mitigation Plan with the collection of seeds for the re-vegetation effort. Seeds may also be collected in additional years and/or seasons as necessary to supplement initial plantings. Annual site burning will occur in the same spring or season and will continue for five (5) years. The control of Phragmites will begin in the fall of the year following EPA approval of the Wetlands Mitigation Plan and continue thereafter for five (5) years. Trash removal will commence during the winter of the year following EPA approval of the Wetlands Mitigation Plan, followed by earthmoving in the next spring or early summer. Planting will follow shortly thereafter. Title to the mitigation site will be transferred to the Indiana Dunes National Lakeshore following the completion of two years of initial restoration work. The restoration and management effort is expected to be completed in five (5) years, at which time the National Lakeshore will assume full responsibility for site management.

Figure 21

CATION MAP



WHITING, HIGHLAND AND GARY U.S.G.S. QUADRANGLES

SCALE: 1" = 2,000'

J.F. New & Associates, Inc.

708 Roosevelt Road
P.O. Box 243
Walkerton, IN 46574
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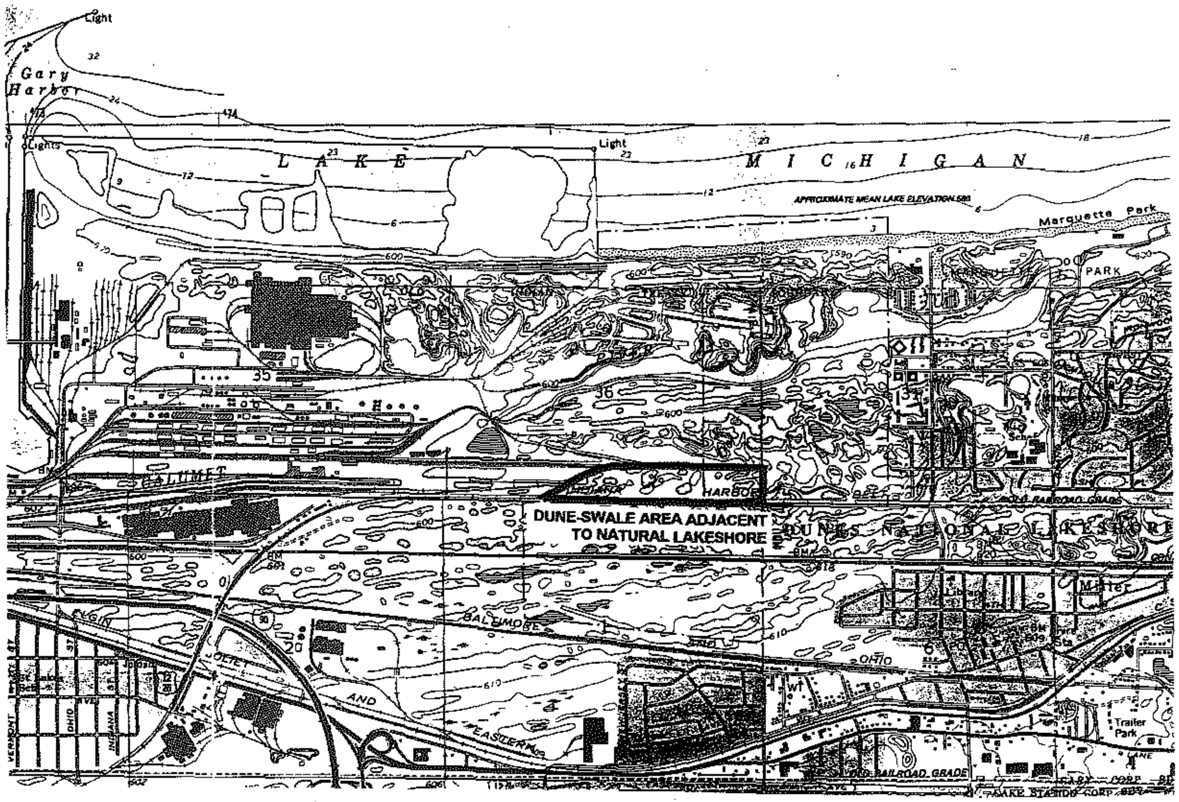
FIGURE 21

MITIGATION SITE LOCATION MAP



WHITING, HIGHLAND AND GARY U.S.G.S. QUADRANGLES

SCALE: 1" = 2,000'

J.F. New & Associates, Inc.

Permitting • Delineations • Mitigation Design • Biological Inventories
Wetland and Prairie Nursery • Lake and Stream Enhancement
Natural Systems for Wastewater Treatment

FIGURE 21

[redacted]

8.0 POST-DREDGING PCB SEDIMENT SAMPLING AND ANALYSIS PLAN

8.1 Introduction and Background

The Consent Decree requires post-dredging sediment sampling for PCBs in the area encompassed by Transects 1-11, 17 (Horizon 1), 20, 32 and 34 because of suspected levels of PCBs in these areas of the GCR.

8.2 Objective

The objective of this plan is to propose a statistically valid sampling design that will accurately characterize the residual sediment PCB levels following the dredging activities within each of the three river isolation cells that encompass the GCR from Transects 1 through 11 and individual Transects 17, 20, 32 and 34. The goal of the dredging project is to eliminate PCB contamination in the GCR by removing contaminated sediment down to native material. As an additional safeguard, the post-dredging sampling will identify any areas above 50 ppm PCBs which will require additional dredging to eliminate such areas.

8.3 Sampling Design

8.3.1 Background

The objective of the sampling design for each isolation cell and Transects 17, 20, 32 and 34 is twofold: 1) provide estimates of the average (e.g., mean or median) residual sediment PCB levels following remediation, and 2) provide information on the spatial distribution of residual sediment PCB levels following remediation. A systematic sampling design is proposed as being best able to meet these two objectives. Systematic sampling consists of taking samples at locations according to some spatial pattern (e.g., sampling at equidistant intervals on a grid system). The advantages of systematic sampling include that it is relatively easy to implement under field conditions, and statistical studies indicate it may be preferred over other sampling designs for estimating means and patterns of contamination (Gilbert 1987). Moreover, systematic sampling generally provides more uniform coverage of the area of interest than simple random sampling, and thus can often yield a more accurate estimate of the mean concentration of the compound of interest.

The simplest systematic designs for sampling an area are the aligned and central aligned square grids (Gilbert 1987). However, because of the rectangular dimensions of the isolation cells in the GCR, a rectangular grid configuration is proposed under this SOW. This rectangular grid configuration and the specific locations of sampling points within this grid are further described in the next section.

8.3.2 Sampling Procedure

The three river isolation cells to be sampled (i.e., A, B, and C) are of different sizes. Thus, the dimensions of the rectangular grid configuration established within each cell will vary across upstream edge of the isolation cell). Three (3) equally-spaced sampling points will be established along each linear Transect (i.e., at approximately one-quarter, one-half, and three-quarter distance across the width of the channel at the location of each linear transect).

- River Isolation Cell C extends from Cell B downstream to USX Outfall 018. This cell is approximately 3,000 feet in length and varies in width between 50 and 65 feet. It includes Transects 6 through 11. Four (4) linear transects will be established across Cell C at 600-foot intervals, with the two end transects occurring 600 feet from the edges of the isolation cell (i.e., at approximately 600, 1,200, 1,800 and 2,400 feet from the upstream edge of the isolation cell). Three (3) equally-spaced sampling points will be established along each linear transect (i.e., at approximately one-quarter, one-half, and three-quarter distance across the width of the channel at the location of each linear transect).

- A single linear transect will be established across each of the following Transects: 17, 20, 32 and 34. Three equally-spaced sampling points will be established along each linear transect (i.e., at approximately one-quarter, one-half, and three-quarter distance across the width of the channel at the location of each linear transect).

the three isolation cells. The procedure outlined herein can be employed in formulating a sampling procedure for individual Transects 17, 20, 32 and 34. The following briefly describes each cell along with the dimensions of its associated rectangular grid sampling system:

- River Isolation Cell A extends from the headwater lagoons culvert downstream to USX Outfall 005. This cell is approximately 2,000 feet in length and varies in width between 40 and 50 feet. It includes Transects 1 through 3. Four (4) linear transects will be established across Cell A at 400-foot intervals, with the two end transects occurring 400 feet from the edges of the isolation cell (i.e., at approximately 400, 800, 1,200 and 1,600 feet from the upstream edge of the isolation cell). Three (3) equally-spaced sampling points will be established along each linear transect (i.e., at approximately one-quarter, one-half, and three-quarter distance across the width of the channel at the location of each linear transect).

- River Isolation Cell B extends from Cell A downstream to USX Outfall 010. This cell is approximately 2,500 feet in length and varies in width between 60 and 65 feet. It includes Transects 4 and 5. Four (4) linear transects will be established across Cell B at 500-foot intervals, with the two end transects occurring 500 feet from the edges of the isolation cell (i.e., at approximately 500, 1,000, 1,500 and 2,000 feet from the

Following completion of the second (cleanup) dredging pass within each isolation cell, samples will be taken within each cell and analyzed for total PCBs, as specified below. Analytical methods utilized will be consistent with those used during past USX sampling of the GCR (i.e., comparable EPA Method in SW-846, Update III, June, 1997); all samples will be analyzed at a targeted detection limit of 100 g/kg (0.1 ppm).

Samples will be taken and analyzed as follows:

- Samples will be collected at each of the three (3) equally-spaced locations along each linear transect for a total of twelve (12) samples per isolation cell.

- Samples will be collected using a 2-inch diameter corer to a depth of 12 inches.

- Discrete samples from each of the 12 sampling locations within a cell will be collected. Each of these samples will be split. Within each transect, one-half of each split sample will be composited with the other samples from the transect into a single sample. The remaining half of each split sample will be maintained as a discrete sample. Thus, there will be four composite and 12 discrete samples per isolation cell and 1 composite and 3 discrete samples per transect for Transects 17, 20, 32 and 34.

- Composite samples will be analyzed immediately for total PCBs. The total PCB concentration in each of the four composite samples from each cell will be determined.

- Based on the results of the PCB analysis of the composite samples from each cell, it will be determined whether analysis of each of the discrete samples from each cell is also needed to conduct a more detailed evaluation of the distribution of PCB levels within each cell. These discrete samples will be held under appropriate storage conditions until PCB determinations on the composite samples are completed and evaluated.

8.3.3 Summary Statistics

The results of each of the composite PCB analyses will be reported (i.e., four per cell), along with the estimated mean or median PCB levels and associated 95 percent confidence intervals for each isolation cell. If PCB analyses of the discrete samples from any of the isolation cells are performed, the results and locations of these samples within the cell will also be reported.

8.3.4 Additional Dredging Activities

Should the analysis required in this section show hot-spots of 50 ppm PCBs or more, USX shall re-dredge such hot-spots to remove such concentrations of PCBs.

8.3.5 Literature Cited

Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold Company, New York, NY.

9.0 POST-REMEDIATION MONITORING PROGRAM

USX has agreed to pay, pursuant to an agreement in the Natural Resources Damages Claim Consent Decree to be entered into by USX, the United States and certain natural resource trustees of the State of Indiana, to fund, after the completion of the GCR Sediment Remediation Project dredging activities, a Post-remediation Monitoring Program to be constructed by State and Federal agencies, based on the sampling studies, protocol and methods used in the U.S. Fish and Wildlife Service November 1994 report entitled "Pre-Remedial Biological and Water Quality Assessment of the East Branch Grand Calumet River, Gary, Indiana, June 1994," to evaluate the effect of the Project on the GCR ecosystem.

10.0 SCHEDULE

10.1 General

Performance of the activities outlined in this SOW will require approximately five years from the date of execution of the final Consent Decree, inclusive of time required by regulatory agencies to review and approve permits and submittals. Two years are required from execution of the revised Consent Decree for performance of engineering studies, design activities and preparation of permit applications. Three additional years are required to implement the remediation plan with approximately one year for construction of facilities, and two years for sediment removal and disposal in the CAMU.

The project schedule is shown in Table 2.

Reports and studies shall be sent to EPA and IDEM to the attention of the EPA division specified. EPA and IDEM will consolidate any comments they may have on USX on reports and studies.

10.2 Grand Calumet River Sediment Remediation SOW Implementation Schedule

Documents, plans and reports to be submitted to EPA pursuant to this SOW shall where applicable be submitted for approval in accordance with Section X of the RCRA Corrective Action Order.

10.3 Limitations

The above schedule was developed assuming:

- Construction operations and facility installations must be completed by February 15 of the year in which dredging operations are to commence or dredging will be postponed to February 15 of the next year.

TABLE 2
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
A	**PERMIT APPLICATIONS AND APPROVALS**		
1	Section 404/10 Dredge Permit Application - Submittal by USX to USACE	6/30/96 (Completed)	2.5
2	IDNR Permit to Construct in Floodway - Submittal by USX	9/5/96 (Completed)	2.5
3	USX to Complete Review of Pre-Public Notice Draft NPDES Permit Language - Submittal of comments by USX to IDEM	1/30/98	2.2, 5.1
4	NPDES Permit Modification		2.5
4a	Application for Modification of NPDES Permit - Submittal by USX	September 1997 (completed)	
4b	Draft NPDES Permit Variance and Draft Antidegradation Demonstration - Submitted by USX	1/16/98 (completed)	
4c	Final NPDES Permit Variance and Antidegradation Demonstration - Submittal by USX	6/1/98	
5	401 Water Quality Certification (WQC)		2.5
5a	401 WQC Application - Submittal by USX	10/23/97 (completed)	
5b	Comments on Pre-Draft 401 WQC and Draft Antidegradation Demonstration - Submittal by USX	12/30/97 (completed)	
6	TSCA PCB Alternative Disposal Method Approval Application - Submittal by USX to EPA and IDEM	12/8/97 (completed)	2.5
7	IDEM Air Permit Application (if required) - Submittal by USX to IDEM	45 days following receipt of EPA's first set of comments on the Air Emissions Investigation Report (Item 17)	2.5
8	City of Gary Special Use Permit and Landfill Variance Application - Submittal by USX to City of Gary	45 days after execution of the RCRA Consent Order	2.5
9	Construction Permit Application for Project Specific Treatment Plant Submitted by USX to IDEM	30 days after IDEM approval of the Project Specific Water Treatment Plant Design (Item 21)	2.5
10	Construction Permit Application for Secondary Treatment System at CAMU - Submittal by USX to IDEM	90 days following receipt of EPA's first set of comments on the CAMU Design for Construction and Operation, Construction Level Report (Item 20)	2.5

TABLE 2 (Continued)
GRAND CALUMET RIVER SEDIMENT REMEDIATION PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
11	CAMU Closure/Post-Closure Plan - Submittal of Draft Plan by USX to EPA	60 days after EPA approval of the CAMU Design for Construction and Operation, Construction Level Report (Item 20)	6.5
B	**TREATABILITY/TECHNICAL STUDIES AND INVESTIGATIONS**		
12	Sediment Removal Investigation Phase I Report - Submittal by USX to EPA The report shall include the following items:	10/31/98	2.1
12a	Topographic Mapping of GCR and Surrounding Area		
12b	Plan Overland Pipeline Routings to/from CAMU, Treatment Plant and Terminal Lagoons		
12c	Investigation of Critical River Facilities Potentially Impacted by Dredging		
12d	Survey and Estimate Quantity of Debris, both Embedded in Sediment and on Banks		
12e	Hydrologic and Hydraulic Analyses to Determine Flows, Velocities, Diversion System Component Size and Water Elevations		
12f	Evaluate Culvert Bulkhead and Isolation Cell Bulkheads and Weirs		
12g	Hydraulic Analysis to Determine Post-Dredge Water Gradient		
12h	Evaluate Source Point Control for Oil/Grease Management		
13	Sediment Removal Investigation Phase II Report - Submittal by USX to EPA The report shall include the following items:	1/31/99	2.1
13a	Locate and Evaluate Foundation Conditions, Earthwork Requirements and Structural Needs for Downstream Access Ramps, Platforms and Roadways		
13b	Evaluate and Select Sites for Decontamination Activities and Develop Protocols and Procedures		
13c	Evaluate Foundation Conditions for Installation of Bulkheads		

TABLE 2 (Continued)
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
13d	Evaluate/Select Method for Tie-in of Bulkheads to Outfalls 005 and 010		
14	Water Treatment Investigation and Report - Submittal by USX to EPA The report shall include the following items:	122 days after issuance of the final NPDES Permit (Item 4)	2.2
14a	Evaluate and Test CAMU Chemical Treatment Systems		
14b	Evaluate Organics Removal for Treated Water from Transects 1-11 and Transect 17, Horizon 1		
14c	Finalize Process Schematic for Water Treatment Plant based on Regulatory Discharge Limits		
15	CAMU Investigation and Treatability Phase I Report - Submittal by USX to EPA The report shall include the following items:	12/8/97 (submitted within the CAMU Design for Construction and Operation, Permitting Level Report (Item 19))	2.3
15a	Characterize Aquifer Adjacent to CAMU to Determine Number and Placement of Wells and Evaluate Surcharge Effects		
15b	Conduct Geotechnical Investigation of Subsurface Conditions and Strength Testing/Evaluation of Site Materials for CAMU Foundations and Berms		
15c	Evaluate Dewatering Alternatives		
16	CAMU Investigation and Treatability Phase II Report - Submittal by USX to EPA. The report shall include the following items:	To be submitted within the CAMU Design for Construction and Operation, Construction Level Report (Item 20)	2.3
16a	Evaluate and Select Methodology for Minimizing, Containing and Collecting Floating Oils/Greases in CAMU		
17	Air Emissions Investigation Report - Submittal by USX to IDEM and EPA.	150 days following receipt of EPA approval of Air Emission Investigation Work Plan (Item 25)	2.4
18	Submittal of CAMU Baseline Groundwater Assessment Report (four quarters) by USX to EPA	Concurrent with the CAMU Design for Construction and Operation Construction Level Report (Item 20)	2.3

TABLE 2 (Continued)
GRAND CALUMET RIVER SEDIMENT REMEDIATION PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
C	**ENGINEERING AND DESIGN**		
19	CAMU Design for Construction and Operation, Permitting Level Report - Submittal by USX to EPA	12/8/97 (completed)	3.1, 3.2, 3.3.3.5, 3.6, 3.7, and 3.8
20	CAMU Design for Construction and Operation, Construction Level Report - Submittal by USX to EPA	137 days after the following: 1. Approval of the Permitting Level Design Report (Item 19) 2. Approval of the CAMU Investigation and Treatability Phase 1 Report (Item 15), and 3. Receipt of City of Gary Special Use Permit and Landfill Variance (Item 8)	3.1, 3.2.3.3 3.5, 3.6.3 and 3.8
21	Project Specific Water Treatment Plant Design -Submittal by USX to EPA and IDEM	122 days after receipt of: 1. The NPDES Permit Modification (Item 4) and 2. EPA and IDEM approval of the Water Treatment Investigation Report (Item 14)	5.2.1
22	Design of River Isolation Cells and Diversion/Bypass Systems - Submittal by USX to EPA	120 days from receipt of: 1. The Section 404/10 Dredge Permit (Item 1) 2. The Permit to Construct (Item 2); and 3. Approval of the Sediment Removal Investigation Phase II Report (Item 13).	4.4.1
23	Design of Dredge, Piping Systems, Silt Curtains and Ancillary Equipment - Submittal by USX to EPA	180 days from receipt of: 1. The Section 404/10 Dredge Permit (Item 1) 2. The Permit to Construct (Item 2) 3. Approval of the Sediment Removal Investigation Phase I Report (Item 12) and 4. The CWA 401 Water Quality Certification (Item 5)	4.3 4.4.1.4 4.5.2 4.3.1

TABLE 2 (Continued)
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
D	**WORK PLANS**		
24	Health and Safety Plans - Submittal by USX to EPA[1]	Final Submittal 90 days after EPA approval of CAMU Operation and Maintenance Plan (Item 27)	1.0
25	Air Emissions Investigation Work Plan - Submittal by USX to EPA	9/18/96 (Completed)	2.4.1
26	Air Quality Monitoring Plan - Submittal by USX to EPA	90 days following receipt of EPA approval of Air Emissions Investigation Report (Item 17)	2.4.2
27	CAMU Operation and Maintenance Plan - Submittal by USX to EPA	244 days from receipt of EPA approval of the CAMU Design for Construction and Operation, Construction Level Report (Item 20), and EPA approval of Air Quality Monitoring Plan (Item 26).	6.1 6.2 6.3 3.1, 3.4, 3.7 3.8 and 6.4
28	CAMU Groundwater Monitoring Plan - Submittal by USX to EPA	Concurrent with the submittal of the CAMU Baseline Groundwater Assessment (Item 18) and CAMU Design for Construction and Operation, Construction Level Report (Item 20)	3.4
29	Spill Prevention Control and Countermeasures Plan - Submittal by USX to EPA	Concurrent with the submittal of CAMU Operation and Maintenance Plan (Item 27) and requires EPA approval of: 1. Design of the Project Specific Water Treatment Plan (Item 21), and 2. Design of Dredge, Piping Systems, Silt Curtains and Ancillary Equipment (Item 23).	4.5

[1] Separate submittals are required prior to initiation of field activities

TABLE 2 (Continued)
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
30	Wetlands Mitigation Plan - Submittal by USX to USACE	6/30/96 (completed)	7.0
E	**CONSTRUCTION OF CAMU**		
31	Completion of CAMU Construction	Construction will be completed within 529 days of receipt of EPA approval of the CAMU Design for Construction and Operation, Construction Level Report (Item 20) and the TSCA PCB Alternative Disposal Method Approval (Item 6). Upon written request with supporting information, EPA will extend this deadline as necessary to allow placement of the liner during average minimum daily temperatures specified by the liner manufacturer. USX will submit any such request at least 45 days in advance of any anticipated delay due to the inability to place the liner during such periods.	3.1, 3.2, 3.3, 3.5, 3.6, 3.7, and 3.8
F	**CONSTRUCTION OF PROJECT-SPECIFIC WATER TREATMENT PLANT**		
32	Completion of Construction and Startup of Project Specific Water Treatment Plant	Construction of the Project Specific Water Treatment Plant will be completed 122 days from receipt of Construction Permit Application (Item 9). Start up of the Project Specific Water Treatment Plant will be initiated by 9/15 of the year preceding the year dredging will begin and will be completed by 12/15 of that same year.	5.2.1
G	**CONSTRUCTION OF DREDGE, SLURRY PIPING AND RELATED FACILITIES**		
33A	Completion of Construction of Custom Dredge, Bypass Equipment, Slurry Piping System and Silt Curtain Systems	Construction will be completed 410 days from receipt of approval of the Design of the Dredge, Piping Systems, Silt Curtains, and Ancillary Equipment (Item 23). Startup activities (placement of the dredge and installation of silt curtains) will be initiated by 11/1 of the year preceding the year dredging will begin and will be completed by 2/1 of the year dredging will begin.	4.3, 4.4

April 1998

TABLE 2 (Continued)
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
33B	Completion of Construction of Access Roads, Decontamination Facilities, Bulkhead Tie-ins and Support Facilities	Construction of the access roads, decontamination facilities, bulkhead tie-ins and support facilities will be completed 285 days from receipt of approval of Design of River Isolation Cells and Diversion/Bypass Systems (Item 22). Startup activities (placement of bulkheads) will be initiated by 11/1 of the year preceding the year dredging will begin, and will be completed by 2/1 of the year dredging will begin.	4.3, 4.4
H	**SEDIMENT REMOVAL**	Sediment Removal Activities set forth in Section 4.0 of the SOW shall begin on the first February 15 which follows completion of (1) CAMU construction (Item 31); (2) Construction and Startup of the Project Specific Water Treatment Plant (Item 32); Construction and Startup of Custom Dredge, Bypass Equipment, and Slurry Piping System (Item 33a); Construction and Startup of Access Roads, Decontamination Facilities (Item 33b); EPA acceptance of the Health and Safety Plan; and EPA approval of the CAMU Operation and Maintenance Plan (Item 27). All sediment removal activities shall be completed 578 days from February 15 of the year in which sediment removal activities begin. Sediment removal subtasks shall be conducted in accordance with the following schedule:	
34	Clear and Grub River Banks	Start - 5/1/--[2] Finish - 2/28/--[3]	4.3, 4.4
35	Transect 17, Horizon 1 Dredging	Start - 2/15--[3] Finish 2/28/--[3]	4.3, 4.4
36	Transect 1-11, Dredging Activities	Start - 2/15--[3] Finish 1/31/--[4]	4.3, 4.4
37	Transect 12-36 Dredging Activities	Start - 3/1/--[3] Finish 9/15/--[4]	4.3, 4.4

[2]Year prior to commencement of sediment removal activities
[3]Year of commencement of sediment removal activities
[4]Year after commencement of sediment removal action

TABLE 2 (Continued)
GRAND CALUMET RIVER
SEDIMENT REMEDIATION
PROJECT SCHEDULE

ITEM	ACTIVITY	DUE DATE	SOW REF
I	**CAMU OPERATION AND MAINTENANCE ACTIVITIES**		
38	Initiation of CAMU Operation and Maintenance	CAMU Operation and Maintenance activities will be conducted in accordance with the schedule approved in the CAMU Operation and Maintenance Plan (Item 27)	6.1, 6.2, 6.3, and 6.4
J	**PROJECT COMPLETION FOLLOW-UP MONITORING ACTIVITIES**		
39	Preparation of Dredging Activities Summary Report	90 days following completion of sediment removal activities	1.0, 4.6
40	Mitigation of Wetlands - Implementation	Will commence March 30 of the year following issuance of the Section 404/10 Dredge Permit (Item 1)	7.0

ATTACHMENT II
SCOPE OF WORK
FACILITY HYDROGEOLOGIC ASSESSMENT AND CURRENT CONDITIONS REPORT
AND
RCRA FACILITY INVESTIGATION

AT

U.S. STEEL GARY WORKS
GARY, INDIANA

ATTACHMENT II

SCOPE OF WORK FOR FACILITY HYDROGEOLOGIC ASSESSMENT AND CURRENT CONDITIONS REPORT AND RCRA FACILITY INVESTIGATION AT U.S. STEEL GARY WORKS

PURPOSE

The purpose of the Facility Hydrogeologic Assessment and Current Conditions Report (Task I) of the RCRA Facility Investigation (RFI) is to consolidate existing information related to the RCRA Corrective Action Program specific to the U.S. Steel, Gary Works facility, (the Facility) and its Solid Waste Management Areas (SWMAs). This summary information will be used to develop the RFI at the Facility.

The purpose of the RFI (Tasks II through Task VIII) of the RCRA Corrective Action Program is to determine the nature and extent of the release(s) of hazardous waste or hazardous constituents at and from the solid waste management areas (SWMAs) and to gather necessary data to support the development of a Corrective Measures Study (CMS). Recognizing that variables are inherent in investigations of complex industrial facilities, the RFI will be developed and carried out to provide data that is sufficient to (1) delineate contamination within and emanating from the Facility, (2) differentiate among selected corrective measure alternatives, (3) establish design criteria for corrective measures, (4) identify potential key deviations from expected conditions, and (5) incorporate necessary changes in selected corrective actions. Respondent shall furnish all personnel, materials, and services for, or incidental to, performing the RCRA Facility Investigation (RFI) at the facility necessary to complete corrective action.

SCOPE

TASK I: FACILITY HYDROGEOLOGIC ASSESSMENT AND CURRENT CONDITIONS REPORT

A. Facility Background & Land Use
B. History of Operations & Waste Management
C. Preliminary Nature & Extent Evaluation
D. Preliminary Environmental Pathway/Receptor Evaluation - including Tier 1 Ecological Assessment
E. Preliminary Facility Conceptual Model
F. Stabilization Measures Implementation
G. Criteria and Definition for SWMAs
H. Preliminary Corrective Measure Technology Evaluation

TASK I: FACILITY HYDROGEOLOGIC ASSESSMENT AND CURRENT CONDITIONS REPORT

Respondent shall submit for U.S. EPA approval, a Task I report providing the background information pertinent to the facility, contamination, and descriptions of the SWMAs to be characterized. Data gathered during previous investigations, and other relevant data shall be summarized. The objective of this report is to present information regarding current conditions at the facility. The results of a Facility Hydrogeologic Assessment may be incorporated with other known pertinent information regarding other relevant facility characteristics (i.e., past/present chemical parameters of material processing, distribution of target contaminants in the environment, a preliminary facility conceptual model of applicable contaminants, current and future land use, potential receptors) to develop a conceptual model of current site conditions. This model may be used to assist in the development of the RFI Workplan.

A. Facility Background & Land Use

Respondent's Task I report shall summarize information that is available concerning the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage, or disposal of solid and hazardous waste.

U.S. EPA performed a RCRA Facility Assessment (RFA) of the facility listing several hundred solid waste management units (SWMUs) and Areas of Concern. Respondent may summarize relevant facility information from U.S. EPA's RFA for information required in Task I.

Respondent's report shall include maps or lists, as appropriate depicting significant facility features pertinent to potential SWMAs, including the following:

1. General geographic location;

2. Property lines with owners of adjacent property clearly indicated;

3. Topography and surface drainage depicting waterways,wetlands, floodplains, water features, drainage patterns, and surface waters;

4. Known tanks, buildings, utilities, industrial and storm sewers, paved areas, easements, rights-of-way, and other key features;

TASK II: FACILITY-WIDE RFI WORKPLAN REQUIREMENTS

A. Program Management Plan
B. Quality Assurance Project Plan (QAPjP)
C. Data Management Plan
D. Health and Safety Plan
E. Public Involvement Plan
F. Schedule to Address the SWMA Investigations
G. Facility Perimeter Zone groundwater Sampling Plan
H. Facility Perimeter Groundwater Sampling Plan Report

TASK III: SWMA-SPECIFIC SCREENING LEVEL PHASE I AND PHASE II SAMPLING PLAN(S)

A. Sampling Plans
B. Critical Value Determination

TASK IV: SOLID WASTE MANAGEMENT AREA INVESTIGATIONS (Phases I and II)

A. Environmental Setting
B. Source or Source Area Characterization
C. Contaminant Characterization
D. Potential Receptors
E. Ecological Assessments

TASK V: SWMA RCRA FACILITY INVESTIGATION REPORTS

A. Data Analysis
B. Protection Standards

TASK VI: REPORTS

A. Preliminary Reports
B. Progress Reports
C. Status Reports
D. Draft and Final Report

TASK VII: COMPILATION OF RFI DATA AND REPORTS

5. Known solid or hazardous waste treatment, storage, and disposal areas;

6. Known identified past and present product and waste underground storage tanks (UST) systems and associated piping;

7. Surrounding land uses (residential, commercial, industrial, agricultural, and recreational);

8. The location of known past and present production, residential, recovery and groundwater monitoring wells within 0.5 miles of the facility boundary, including well completion data and ground and top of casing elevations. These elevations and details may be included as an attachment which outlines well depth, aquifer(s) screened, screen length, screen interval, as measured from average mean sea level (AMSL), well diameter, well material and open-hole or sand/gravel pack interval from AMSL.

Maps shall be at a scale of either 1″ = 200′ or 1″ = 500′, as appropriate for the facility, and 1″ = 1000′ for surrounding areas, or be of a scale that provides sufficient detail and accuracy to locate and report current and future work performed at the site relevant to the RCRA Corrective Action Program.

B. History of Operations & Waste Management

Information will be provided, as appropriate, to undertake corrective action.

1. A history and description of the ownership and operation, solid and hazardous waste generation, treatment, storage, and disposal activities at the facility.

2. A history and description of the ownership and operation of USTs and materials or products managed within the USTs at the facility.

3. Estimation of known periods of past product and waste spills or deposits, identification of the materials spilled, the amount spilled, the amount recovered, the location where spilled, media impacted, and a description of the response actions conducted (local, State, or Federal response units or private parties), including any inspection reports or technical reports

generated as a result of the response.

4. A summary of known past and present environmental permits and federally regulated USTs registrations requested and/or received, any enforcement actions and their subsequent responses, and a list of documents and studies prepared for the facility.

C. Preliminary Nature and Extent Evaluation

Respondent shall summarize the known nature and extent of contamination findings from existing information. Respondent shall provide and describe the existing information on the known nature & extent of contamination.

1. Respondent's information shall include a summary of known source areas of contamination. This, at a minimum, should include all RCRA regulated units and other solid waste management units, USTs, above-ground tanks, spillage areas, permitted releases of hazardous constituents, and other suspected source areas of contamination.

   For each source area of contamination or unit, Respondent shall identify the following:

   a. Location of unit/area (which shall be depicted on a facility map;

   b. Quantities of solid and hazardous wastes present;

   c. Types of materials managed in USTs and above-ground tanks at the facility.

   d. Hazardous waste or constituents, to the extent known; and

   e. Respondent shall include, based on existing information, a qualitative and/or quantitative assessment and description of the existing degree and extent of contamination within the SWMAs. This should include:

      i) Available monitoring data and information on locations and levels of contamination at the facility;

ii) Potential contaminant migration pathways including information on geology, pedology, physiography, hydrogeology, hydrology, water quality, meteorology, air quality, and migration through food chains; and

iii) Any known or observed effects of site contaminants to biota, such as fish kills, stressed vegetation, or other obvious impacts.

f. Potential impacts of contaminants on human health and the environment, including demography, groundwater and surface water use, land use, and potential ecological receptors, including any threatened and endangered species and species proposed for listing as threatened and endangered list. This assessment should be based on existing site information, literature-based information on contaminant fate and toxicity, and available criteria and standards (e.g., Ambient Water Quality Criteria).

The Respondent will furnish the groundwater assessment reports for the three RCRA regulated units located onsite. The groundwater assessment workplan and the related quality assurance project plan will also be provided.

The Respondent will include the Plant-Wide Groundwater Assessment (PWGA) Phase I Report.

D. Preliminary Environmental Pathway/Receptor Evaluation Including Tier 1 Ecological Assessment

Respondent shall review and evaluate available and readily accessible information to determine if the known contaminants from the SWMAs would be a threat or potential threat to socially or biologically important plants, animals, or habitats at or near the site. This "desktop" effort is intended to quickly screen those locations that may need closer evaluation to determine the type and degree of ecological risk.

Respondent shall gather data from available literature describing the human populations and environmental systems that are susceptible to contaminant exposure from the site. The following characteristics may be considered, as appropriate for the contamination condition detected:

1. Local uses and probable future uses of groundwater:

a. Type of use (e.g., drinking water source, municipal, residential, agricultural, domestic/non-potable, and industrial); and

b. Locations of groundwater users wells and discharge areas.

2. Local uses and probable future uses of surface water draining from the facility:

   a. Domestic and municipal (e.g., potable, lawn/gardening watering);

   b. Recreational (e.g., swimming, fishing);

   c. Agricultural;

   d. Industrial and Commercial; and

   e. Environmental (e.g., fish and wildlife propagation).

3. Human use or access to the facility and adjacent lands, including:

   a. Recreation;

   b. Hunting;

   c. Residential;

   d. Industrial and Commercial; and

   e. Relationship between population locations and prevailing wind direction.

4. A demographic profile of the people who use or have access to the facility and adjacent land including: age; sex; and sensitive subgroups, as is readily available.

5. Ecological characteristics of the facility. Readily available data for this may include the following:

   a. Chemical sampling results in potentially exposed habitats and reference sites.

   b. Biological community assessment.

   c. Habitat assessment of aquatic and terrestrial habitats on or potentially affected by the site.

d. Existing data on the potential occurrence of biota that use these habitats will be obtained and reviewed for relevance to the mapped areas. Where appropriate, notation will be made of areas where industrial or other societal activities may affect these habitats. Natural perturbations or temporal variations that may impact these systems shall also be reviewed. Respondent shall summarize the environmental pathways and receptors that are relevant to potential SWMAs, including:

i) General description of major habitat types (e.g., grasslands, forests, lakes, streams, wetlands) located in, adjacent to, or potentially affected by the facility.

ii) General summary of plants and animals at and adjacent to the site obtained from existing site information or literature based information.

E. Preliminary Facility Conceptual Model

Respondent will develop a conceptual model of site conditions utilizing the previously described existing information. The purpose of the model is to serve as the basis for summarizing and visualizing the relationships between use of the land and contaminants, human influence on the presence and distribution of contaminants in the environment, their spread and fate in the environment, and the potential effect on life in that environment. The model will be used as a guide for 1) RFI Workplan planning and 2) Self Implementing Stabilization Measures/Interim Stabilization Measures (SISM/ISM) and Corrective Measures planning and implementation. It will be updated and refined as new information is acquired.

F. Stabilization Measures Implementation

If a stabilization measure is determined to be necessary, Respondent shall implement such actions in accordance with Attachment III of this Order. A listing and summary of information related to known stabilization measures undertaken prior to consent order signature shall be provided.

G. Criteria and Definition for SWMAs

1. Criteria Used to Define SWMAs

Using the criteria set forth below, the Respondent shall provide a list of SWMAs with supporting justification for defining the areal extent of the SWMA. A brief description of each SWMA shall be included.

A SWMA is defined as a grouping of SWMUs and/or Areas of Concern within the facility property boundary. The criteria shall include:

a. Physical conditions and/or chemical parameters present in the area (i.e., groundwater pH, physical and natural hydrological barriers, groundwater geochemistry, groundwater flow characteristics, etc.);

b. Potential receptors;

c. Historical land use;

d. Nature of contamination in the area;

e. Past, current, and/or probable future operational use of an area;

f. Grouping of downgradient sources; and/or

g. Application of common corrective measure solutions.

H. Preliminary Corrective Measure Technologies Evaluation

The Respondent shall discuss the potential corrective measure technologies that may be used for the containment, treatment, and/or removal of contamination from the facility and/or a specific SWMA. This information will be focused only on measures appropriate for the specific constituents suspected to be present above the U.S. EPA-approved protection standards. This evaluation shall identify applicable field data that may be collected in the SWMA investigations to facilitate the evaluation and selection of the appropriate corrective measures.

TASK II: FACILITY-WIDE RFI WORKPLAN REQUIREMENTS

Respondent shall submit to U.S. EPA the RFI Workplan within one hundred eighty (180) days after the approval of Task I of the RFI. The Workplan shall set forth in sufficient detail the steps to be taken to investigate all SWMAs identified in Task I. The Workplan shall include each of the Plans set forth in paragraph A through G below. As set forth in paragraph F, the Workplan shall provide a schedule for submission of a sampling plan for each SWMA identified in Task I. Such sampling plans shall be prepared in accordance with the provisions of Task IV and V and the U.S. EPA-approved Quality Assurance Project Plan.

Workplan components are intended to be utilized for RFI and stabilization measures.

A. Program Management Plan

Respondent shall prepare a Program Management Plan, which will include a discussion of the technical approach and schedule. This plan shall document the overall management approach to the RFI. The Project Management Plan also will include a description of the qualifications of personnel performing or directing the RFI, including all contractor personnel. The approach will involve "phased" investigations with implementation of a Facility Perimeter Groundwater Investigation to further prioritize the subsequent onsite and offsite investigations. The plan shall discuss the "phased" approach in the context of the SWMA Investigation relative to the facility-wide RCRA Facility Investigation.

B. Quality Assurance Project Plan (QAPjP)

Respondent shall prepare a QAPjP that describes the approach to data collection that results in data of adequate and appropriate documented technical quality for the purpose(s) intended. This QAPjP is to be used to ensure that Data Quality Objectives (DQOs) are defined and documented. The overall level of uncertainty that is acceptable will be defined as part of the DQO. QAPjP preparation will consider the value of the level of QAPjP documentation compared to the decisionmaking and confidence level needs from the results such that the data is of adequate technical quality for the RFI Corrective Action decisionmaking.

Respondent shall prepare a QAPjP to document monitoring procedures, field measurements and sample analyses performed during the investigation. The QAPjP shall be used to collect qualitative and quantitative analytical data, under phased investigation. An overall QAPjP shall be developed in accordance with the U.S. EPA, Region 5 Model QAPjP, as updated. (Please note that specific requirements outlined in Attachment IV are subject to change, with U.S. EPA's approval, based on information provided in the QAPjP, (e.g., the number of duplicative matrix samples required for QA/QC). The QAPjP components may vary in complexity based on the acceptable levels of uncertainty and decisionmaking needs associated with the goals of the activities undertaken for this program. The QA/QC requirements shall allow for use of screening level investigation results applying less stringent QA/QC validation. Either Risk Assessment Guidance for

Superfund, Part A-Human Health (RAGS), SW-846 (November 1986, including all updates) or Guidance for Data Useability in Risk Assessment (Part A-April 1992 or updated versions) represents the documents that may be used for guidance on QA/QC documentation data needs.

A pre-QAPjP meeting shall be held prior to preparation of the QAPjP. Participants should include, but are not limited to, the Respondent, their QAPjP preparer, laboratory representatives, U.S. EPA Project Coordinator, U.S. EPA Quality Assurance and Laboratory representatives. (A performance audit will be conducted by U.S. EPA on laboratories selected by Respondent. This audit must be completed and laboratories approved for use on the project prior to the approval of the RFI Workplan by U.S. EPA and to the start of field work for the RFI, beginning with Task II).

C. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results from SWMA investigations. This plan shall identify and establish data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also present the raw data and conclusions of the investigation which meet the following requirements. All groundwater data shall be submitted in a computer accessible format, i.e. diskette. The program used shall be compatible with the U.S. EPA, Region 5 groundwater database known as GRITS/STAT, The Ground-Water Information Tracking System/Statistical Analysis Capability, as updated.

1. Data Record

The Data Record shall include the following and be available at the facility upon request:

a. Unique sample or field measurement code;

b. Sampling or field measurement location and sample or measurement type;

c. Sampling or field measurement raw data;

d. Laboratory analysis ID number;

e. Property or component measured; and

f. Result of analysis (e.g., concentration).

2. Tabular Displays

The following data shall be presented in appropriate tabular displays:

a. Unsorted summary listing of analytical results;

b. Results for each medium or constituent monitored;

c. Data reduction for statistical analysis;

d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography);

e. Compilation of sorted data from an information database;

f. Display levels of constituent concentrations at each sampling location above "critical value" as defined herein; and

g. Display target constituent levels, averages, and maxima.

3. Graphical Displays

As determined by U.S. EPA, certain data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.). Color graphics may be necessary to provide clarity:

a. Display sampling location and sampling grid;

b. Indicate boundaries of sampling area;

c. Display geographical extent of constituent concentrations;

d. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and

e. Indicate features affecting intramedia and intermedia transport, and show potential receptors.

D. Health and Safety Plan

Respondent shall prepare a Health and Safety Plan.

1. The Health and Safety Plan shall:

   a. Provide a brief facility description, including availability of resources such as roads, water supplies, electricity and telephone service;

   b. Describe the known hazards and evaluate the health and safety risks associated with each activity conducted;

   c. List key personnel and alternates responsible for site safety, response operations, and for protection of human health;

   d. Delineate work areas;

   e. Describe levels of protection to be worn by personnel;

   f. Establish procedures to control site access;

   g. Describe decontamination procedures for personnel and equipment;

   h. Establish site emergency procedures;

   i. Address emergency medical care for injuries and toxicological problems;

   j. Describe requirements for an environmental surveillance program;

   k. Specify any routine and special training required for responders; and

   l. Establish procedures for protecting workers from weather-related problems.

2. The Facility Health and Safety Plan shall be consistent with:

   a. OSHA Indiana Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

   b. U.S. EPA Order 1440.1 - Respiratory Protection;

c. U.S. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. Facility Contingency Plan;

e. Facility Response Plan;

f. U.S. EPA Standard Operating Safety Guide (1984);

g. OSHA regulations, particularly those in 29 CFR 1910 and 1926;

h. State and local regulations; and

i. Other U.S. EPA guidance as provided.

E. Public Involvement Plan

The Respondent shall prepare a plan for the dissemination of information to the public regarding RFI activities and results. Public Involvement activities that may be required of the Permittee/Respondent include the following:

1. Conducting an open house or informal meeting (i.e., availability session) in a public location where people can talk to agency officials and Permittee/Respondent on a one-to-one basis;

2. Preparing fact sheets summarizing current or proposed corrective action activities (all fact sheets should be reviewed by the implementing agency prior to public distribution);

3. Communicating effectively with people who have vested interest in the corrective action activities, (e.g., providing written or verbal information in the foreign language of a predominantly non-English-speaking community); and

4. Maintaining an easily accessible repository (such as a town hall or public library or the facility itself, in some limited circumstances) of information on the facility-specific corrective action program, including the order or permit, approved workplans, and/or other reports.

5. Other mechanisms for public involvement on a continuing basis.

A schedule for public involvement activities shall be included in the Public Involvement Plan.

F. Schedule to Address the SWMA Investigations

The Respondent shall submit a schedule for the submittal of a screening level sampling plan for each SWMA identified in Task I. Such Sampling Plan(s) shall be prepared in accordance with the provisions of Task III and the U.S. EPA-approved QAPjP. In addition, the workplan shall contain preliminary schedule for the completion of Tasks IV through VII of this attachment. If, as a result of subsequent investigations, Respondent believes that the schedule for addressing each SWMA should be modified in order to address risks to human health and the environment, it may propose such changes to U.S. EPA. If approved by U.S. EPA, the schedule will be modified in accordance with such approval.

G. FACILITY PERIMETER ZONE GROUNDWATER SAMPLING PLAN

The Respondent shall prepare a Sampling Plan for the Perimeter Groundwater Investigation. The plan shall document the data collection strategy, and investigation-specific QA/QC not already specified in the QAPjP. Respondent shall include a schedule for implementation in the RFI Workplan.

The Facility Perimeter Zone Groundwater Sampling Plan may consider well spacing and sampling/analysis variability along the facility perimeter, as appropriate, depending on offsite adjacent land uses and onsite groundwater flow patterns from SWMAs.

H. FACILITY PERIMETER ZONE GROUNDWATER SAMPLING PLAN REPORT

Respondent shall submit to U.S. EPA a report that summarizes the results of the Facility Perimeter Zone Groundwater Sampling Plan. The data collected from the plan shall be used to prioritize the subsequent SWMA investigations. The report shall include, at a minimum, a description of the prioritization process; how the SWMAs and/or components thereof were prioritized, and a listing of the priorities.

TASK III: SWMA-SPECIFIC PHASE I SCREENING LEVEL AND PHASE II SAMPLING PLANS FOR SWMAs

The Respondent shall prepare Sampling Plan(s) for each SWMA identified in Task I of the RFI. The Sampling Plan(s) shall be prepared for each SWMA in accordance with the requirements established in the RFI Workplan QAPjP. The Sampling Plan(s) shall, at a minimum: 1) document the data collection strategy; 2) the specific constituents to be investigated; and 3) reference SWMA-specific QA/QC requirements. This information will be used during the investigation to characterize the environmental setting, source, and contamination, and to ensure that the information, data and resulting decisions are technically sound, statistically valid, and properly documented.

The RFI will consist of a phased investigation. The phased-approach will be performed in two parts: The Phase I screening level sampling phase, using U.S. EPA-approved screening methods (e.g. hydropunch, etc.), will delineate environmental setting, contamination sources, and the contamination emanating at and from a SWMA; and Phase II confirmation/verification sampling phase, at a minimum, will be used to determine if threats to human health and/or the environment are present at or from the SWMA. A monitoring well system will be proposed to collect the required information for Phase II data.

The Sampling Plan(s) shall document, to the extent practical, the locations to be sampled, and as appropriate, the types of samples to be collected (e.g., composites, grabs), number of samples to be collected, and the constituents to be analyzed. The Sampling Plan(s) shall incorporate pertinent information in the QAPjP pertaining to analytical methods, detection limits, etc., that meet the data quality objectives of the respective "phases" of the investigation. The Respondent shall prepare each Sampling Plan(s) for approval by U.S. EPA.

A. Sampling Plans

The Phase I screening level sampling plans shall be prepared using the following guidelines: 1) use target constituents; 2) apply QA/QC appropriate for a screening level investigation where, at a minimum, results can be used for nature and extent determinations; 3) developing a "critical value" as discussed in Section B.

The Phase II Sampling Plan(s) shall be prepared after review and evaluation of the screening level investigation findings. The purpose of the Phase II sampling program is to verify or confirm the presence or absence of the specific target contaminants within and emanating from a SWMA.

1. Each respective sampling plan(s) shall briefly discuss, as appropriate:

   a. Sampling Approach

      i) Identify sampling locations, depth, etc.;

      ii) Identify media (e.g., ground water, air, soil, sediment, fill, etc. as appropriate) to be sampled;

      iii) Identify types of samples (e.g., composites vs. grabs) and the number of samples to be collected;

      iv) Identify constituents to be sampled;

      v) Identify laboratory and analytical methodology as defined in the QAPjP;

      vi) Identify ancillary data needs, if any;

      vii) Identify sampling techniques; and

      viii) Identify necessary QA/QC samples.

2. Graphical Displays

   The following may be presented in graphical format (e.g. area maps, plan maps, or subsurface profiles) Color graphics may be necessary to provide clarity:

   a. Sampling location; and

   b. Boundaries of sampling area.

B. Critical Value Determination

A "critical value" for target analytes shall be prepared for specific environmental media for the purposes of developing the sampling plan in Phase I and guiding the direction of the area of sampling programs of Phase II in each SWMA. In areas where the critical values levels have been exceeded further investigation will be required to determine the nature and extent of the contamination. In areas where critical values have not been exceeded confirmatory sampling will be performed to produce data sufficient to conduct risk assessment. Respondent will consider the following criteria in the development of the CV: 1)

Practical Quantification Levels (PQLs) for the specific contaminants and matrix, e.g., groundwater or fill; 2) the "natural" contaminant concentration levels in the environmental media being investigated; 3) the anthropogenic background contaminant concentration levels at or near the Facility that cannot be directly attributed to the Respondent's industrial activities; and 4) a contaminant concentration factor which considers an appropriate "risk" scenario for each environmental media investigated.

TASK IV: SOLID WASTE MANAGEMENT AREA INVESTIGATIONS

Respondent shall conduct investigations necessary to: 1) characterize the identified SWMA environmental setting; 2) define sources of contamination; 3) delineate the degree and extent of contamination at and from SWMAs; 4) define where a threat to human health or the environment exists at and from the SWMAs; and 5) identify actual or potential receptors.

Each investigation will be prepared to determine, the nature and extent of the release of hazardous waste or hazardous constituents at and from the SWMA and where a threat to human health or the environment is present. The investigation activities required in Task V, shall follow the plans set forth in Task II and IV. The sampling and analyses shall be conducted in accordance with the QAPjP applying the level of documentation appropriate to the Data Quality Objectives.

Respondent shall develop the Phase I and Phase II Sampling Plans based upon the following to the extent relevant to the specific data quality objectives of the respective phase (i.e. Phase I or Phase II).

A. Environmental Setting

Respondent shall collect information to supplement and verify existing information on the environmental setting at the SWMA. Respondent shall characterize the following:

1. Hydrogeology

Respondent shall conduct a program to evaluate hydrogeologic conditions at the facility and within the SWMA. Relevant information from the Plant Wide Groundwater Assessment (PGWA) and the Perimeter Groundwater Sampling Report will be used to provide general facility hydrogeologic setting information supplemented by any subsequent hydrogeologic information obtained in the course of performing RFI activities.

Respondent may utilize the PWGA results to guide the RFI SWMA investigation activities. This program shall provide the following information:

a. A description of the regional, facility, and SWMA specific geologic and hydrogeologic characteristics affecting groundwater flow beneath the facility, including:

    i) Regional, facility, and SWMA specific stratigraphy: description of strata including strike and dip; and identification of stratigraphic contacts;

    ii) Depositional history;

    iii) Identification and characterization of areas and amounts of ground-water recharge and discharge;

    iv) Regional, facility, and SWMA specific groundwater flow patterns; and

    v) Seasonal variations in the groundwater flow regime.

b. An analysis of any topographic features that might influence the groundwater flow system;

c. Based on published literature, field data, tests, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the SWMA (i.e., the aquifers and any intervening saturated and unsaturated units), including:

    i) Hydraulic conductivity and porosity (total and effective);

    ii) Lithology, grain size, sorting;

    iii) An interpretation of hydraulic interconnections between saturated zones;

    iv) The attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content etc.);

v) Development of a "critical value" contaminant concentration levels in groundwater from existing data.

d. Based on field studies, cores, and hydrogeologic cross-sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways, identifying:

i) Sand and gravel deposits in unconsolidated deposits;

ii) Zones of channeling in consolidated or unconsolidated deposits;

iii) Zones of high permeability or low permeability that might direct or restrict the flow of contaminants;

iv) The uppermost aquifer (geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs);

v) Water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration, including perched zones of saturation; and

vi) Man-made structures that might direct or restrict the flow of contaminants.

e. Based on data obtained from groundwater monitoring wells and piezometers installed up-gradient and down-gradient of the potential contaminant source or source areas, a representative description of water level or fluid pressure monitoring, including:

i) Water-level contour and/or potentiometric maps;

ii) Hydrogeologic cross-sections showing vertical gradients;

iii) The flow system, including the vertical and horizontal components of flow; and

iv) Any temporal changes in hydraulic gradients, i.e., due to tidal or seasonal influences.

f. A description of man-made influences that may affect the hydrogeology of the SWMA, identifying:

   i) Known active and inactive local water-supply and production wells with an approximate schedule of pumping; and

   ii) Known man-made hydraulic structures (tunnels, pipelines, French drains, industrial sewers, storm sewers, sanitary sewers, ditches, unlined ponds, septic tanks, National Pollution Discharge Elimination System (NPDES) outfalls, retention areas, etc.).

2. Soils, Sediments, and Fill

Respondent shall characterize the soil, sediments, and fill above the water table in the vicinity of the contaminant releases at or from the SWMA. Such characterization shall, as appropriate, include but not be limited to the following information:

a. Soil Conservation Service (SCS) soil classification;

b. Surface soil distribution;

c. Soil profile, including American Standard Testing and Materials (ASTM) classification of soils;

d. General geologic terms should be used to describe the physical characteristics of the naturally occurring geologic material;

e. Transects of soil profiles and geologic profiles;

f. Hydraulic conductivity (saturated and unsaturated);

g. Relative permeability;

h. Bulk density;

i. Porosity;

j. Sorptive capacity;

k. Cation exchange capacity (CEC);

l. Organic content;

m. pH;

n. Particle size distribution;

o. Depth of water table;

p. Moisture content;

q. Effect of stratification on unsaturated flow;

r. Infiltration;

s. Evapotranspiration;

t. Storage capacity;

u. Vertical flow rate;

v. Mineral content; and

w. Development of "critical value" contaminant concentration levels in the sediment, fill and soils from existing data.

3. Surface Water

Respondent shall conduct a program to characterize the surface water bodies in the vicinity of the SWMA. Such characterization shall include, but not be limited to, the following activities and information:

a. Description of the temporal and permanent surface water bodies including:

i) For lakes: location, elevation, surface area, inflow, outflow, depth, temperature stratification, volume, and a description of substrate and cover;

ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment;

iii) For streams, ditches, wetlands, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e., 100 year event), and a description of substrate and surface cover.

iv) Drainage patterns; and

v) Evapotranspiration.

b. Description of the chemistry of the natural surface water and related sediments (Lake Michigan). This includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients (NH_3, NO_3^-/NO_2^-, PO_4^{-3}), chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc; and

i) Development of "critical value" contaminant concentration levels in surface water from existing data.

ii) Description of sediment characteristics including:

iii) Depositional area;

iv) Thickness profile; and

v) Physical and chemical parameters (e.g., grain size, distribution, density, organic carbon content, ion exchange capacity, etc., and other parameters, as directed by U.S. EPA.

4. Air

Respondent shall provide information characterizing the climate in the vicinity of the SWMA. Such information shall include, but not be limited to:

a. A description of the following parameters:

i) Annual and monthly rainfall averages;

ii) Monthly temperature averages and extremes;

iii) Wind speed and direction;

iv) Relative humidity/dew point;

v) Atmospheric pressure;

vi) Evaporation data;

vii) Development of inversions; and

viii) Climate extremes that have been known to occur in the vicinity of the facility, including frequency of occurrence.

b. A description, based on existing permit data, if sufficient, of topographic and man-made features which affect air flow and emission patterns, including:

i) Raw materials storage piles;

ii) Surface water bodies (e.g., rivers, lakes, bays, etc.);

iii) Wind breaks; and

iv) Buildings/man-made structures.

B. Source Characterization

Respondent shall collect analytical data to characterize the wastes and the materials in USTs, the areas where wastes and USTs have been placed, collected, or removed, including: type; quantity; physical form; disposition (containment or nature of deposits); and SWMA and facility characteristics affecting release (e.g., facility security, and engineered barriers). This shall include quantification, as appropriate, of the following specific characteristics, at each source area:

1. Unit/Disposal area characteristics:

a. Location of unit/disposal area;

b. Type of unit/disposal area;

c. Design features;

d. Operating practices (past and present);

e. Period of operation;

f. Age of unit/disposal area;

g. General physical conditions; and

h. Method used to close the unit/disposal area.

2. Waste and USTs materials characteristics:

   a. Type of wastes or materials placed in each unit, including:

      i) Hazardous classification (e.g., flammable, reactive corrosive, oxidizing or reducing agent);

      ii) Quantity;

      iii) Chemical composition; and

      iv) Waste or material form (bulk or containerized).

   b. Physical and chemical characteristics:

      i) Physical form (solid, liquid, gas);

      ii) Physical description (e.g., powder, oily sludge);

      iii) Temperature;

      iv) pH (if applicable);

      v) General chemical class (e.g., acid, base, solvent);

      vi) Molecular weight;

      vii) Density;

      viii) Boiling point;

      ix) Viscosity;

      x) Solubility in water;

      xi) Cohesiveness of the waste;

      xii) Vapor pressure; and

      xiii) Flash point.

   c. Migration and dispersion characteristics, as appropriate:

      i) Sorption;

      ii) Biodegradability, bioconcentration, biotransformation;

iii) Photodegradation rates;

iv) Hydrolysis rates; and

v) Chemical transformation.

d. Respondent shall document the procedures used in making the above determinations.

C. Contamination Characterization

Respondent shall collect analytical data about contamination within or associated with groundwater, soils, sediments, fill, surface water, air, and subsurface gas contamination in the SWMA. This data shall be sufficient to define the extent, origin (to the extent practical), direction, and rate of movement of contaminant migration for the purpose of evaluating and implementing corrective action. Data shall include time and location of sample collection, media sampled, concentrations of contaminants found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. Respondent shall address the following types of contamination at the SWMA:

1. Groundwater Contamination

Respondent shall conduct a Groundwater Investigation to characterize any plumes of contamination at the facility. This investigation shall at a minimum provide the following information:

a. A description of the horizontal and vertical extent of any immiscible or dissolved plumes originating from the facility;

b. The horizontal and vertical directions of contamination movement;

c. The velocities of contaminant movement;

d. The horizontal and vertical concentration profiles of constituents from 40 CFR Part 264, Appendix IX list believed to be in the plumes. If there is no valid information which can eliminate potential Appendix IX constituents within the plume, constituents from Appendix IX will be analyzed in total for a period of time to appropriately develop a list of constituents within the plume;

e. An evaluation of factors influencing the plume movement; and

f. An extrapolation of future contaminant movement. Respondent shall document the procedures to be used in making the above determinations (e.g., well design, well construction, geophysics, modeling, etc.).

2. Soil, Sediment, and Fill Contamination

Respondent shall conduct an investigation to characterize the contamination of the soil, sediments, and fill above the water table in the vicinity of the contaminant release. The investigation shall include the following information:

a. A description of the vertical and horizontal extent of contamination;

b. A description of contaminant and soil chemical properties within the contaminant source area and plume. This includes contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation, and other factors that might affect contaminant migration and transformation, and may be based upon relevant data in the literature;

c. Specific contaminant concentrations;

d. The velocity and direction of contaminant movement; and

e. An extrapolation of future contaminant movement.

Respondent shall document the procedures used in making the above determinations.

3. Surface Water and Sediment Contamination

Respondent shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from the contaminant releases at the facility. The investigation shall include, but not be limited to, the following information:

a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility, and the extent of contamination in underlying sediments;

b. The chemical composition of the gases being emitted, including CO_2 and O_2;

c. The rate, amount, and density of the gases being emitted, including CO_2 and O_2; and

d. Horizontal and vertical concentration profiles of the subsurface gases emitted.

Respondent shall document the procedures used in making the above determinations.

D. Potential Receptors

Respondent shall collect supplemental data, as appropriate from available literature and/or field observation describing the human populations and environmental systems that are potentially impacted by contaminant exposure from the SWMA. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems also may be needed. The following characteristics shall be identified, as appropriate for the location and contamination condition:

1. Local uses and probable future uses of groundwater:

   a. Type of use (e.g., drinking water source, municipal, residential, agricultural, domestic/non-potable, and industrial); and

   b. Locations of groundwater users, including wells and discharge areas.

2. Local uses and probable future uses of surface water draining from the facility:

   a. Domestic and municipal (e.g., potable, lawn/gardening watering);

   b. Recreational (e.g., swimming, fishing);

   c. Agricultural;

   d. Industrial and Commercial; and

   e. Environmental (e.g., fish and wildlife propagation).

b. The horizontal and vertical direction of contaminant movement;

c. The contaminant velocities;

d. An evaluation of the physical, biological, and chemical factors influencing contaminant movement;

e. An extrapolation of future contaminant movement; and

f. A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, and specific contaminant concentrations, etc.

Respondent shall document the procedures used in making the above determinations.

4. Air Contamination

Respondent shall conduct an investigation to characterize to the extent practical the particulate and gaseous contaminants released into the atmosphere. This investigation shall provide the following information:

a. A description of the horizontal and vertical direction and velocity of contaminant movement;

b. The rate and amount of releases; and

c. The chemical and physical composition of the contaminants released, including horizontal and vertical concentration profiles.

Respondent shall document the procedures used in making the above determinations.

5. Subsurface Gas Contamination

Respondent shall conduct an investigation to characterize to the extent practical subsurface gases emitted from buried hazardous waste, hazardous constituents in the groundwater, and USTs. This investigation shall provide the following information:

a. A description of the horizontal and vertical extent of subsurface gas migration;

3. Human use or access to the facility and adjacent lands, including but not limited to:

   a. Recreation;

   b. Hunting;

   c. Residential;

   d. Industrial and Commercial; and

   e. Relationship between population locations and prevailing wind direction.

4. A demographic profile of the people who use or have access to the facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

5. Ecological characteristics of the facility.

Those areas where important communities or habitats are located in the Tier 1, desktop assessments (above) will be noted and related to the site contaminant characterization studies (C above). Areas where ecological receptors including, communities or habitats have potential to be affected by contaminants at the facility will be selected for further consideration in Tier 2 and possibly Tier 3 studies during the RFI, as warranted.

The scope of this Receptor Identification activity will be dictated by the potential for and degree of contamination known or suspected from the SWMA and/or facility appropriate for assessing ecological risk. If the Preliminary Pathway/Receptor Evaluation (described above) undertaken as part of the Facility Hydrogeologic Assessment and Current Conditions Report sufficiently describes pathways/receptors from SWMAs to support a conclusion that adverse ecological effects are not likely, then no further assessment is needed with U.S. EPA's approval.

E. Ecological Assessment

If a Tier 2 Ecological Assessment is required after approval of the FHACCR, Respondent shall include in the RFI Workplan provisions for conducting such Tier 2 Ecological Assessment and a schedule therefore in accordance with this paragraph. Respondent may arrange a pre-meeting to confer with U.S. EPA regarding endpoint selection. A conceptual model including an identification of ecological assessment endpoints will be included in the RFI Workplan. Endpoint selection criteria must be clearly explained therein. The ecological assessment will be conducted on for those areas identified in the Tier 1 ecological assessment as having ecological receptors potentially affected by the contaminants at the facility.

1. Tier 2 Ecological Assessment

If a Tier 2 Ecological Assessment is required, Respondent shall undertake limited field work consisting of qualitative ecological reconnaissance and limited sampling of environmental media. The ecological assessment shall include an exposure analysis and ecological response analysis, derive a ecological risk estimate and provide an interpretation of ecological significance.

The Tier 2 Ecological Assessment shall include the following elements:

a. Representative chemical or physical sampling in important habitats that have potential for exposure to contaminants at or from the facility;

b. Field observations and/or screening level laboratory testing to estimate the potential toxic effects that may be attributed to the contaminants above investigation action levels or protection standards, if available. This may include statistical approaches to identify relationships between the occurrence of the contaminant(s) and the communities of interest, or selected bioassays where appropriate to refine or characterize the potential toxicity;

c. Evaluation of biological accumulation will be estimated, where other data are inconclusive, by approaches most relevant to the contaminant of interest. These approaches may include calculated estimates from the literature, use of specific biomarkers, or selection of representative species for tissue analyses; and/or

d. Assessment of the aquatic and/or terrestrial biological populations and community(ies) exposure to releases from the facility. This assessment shall include comparison to a reference habitat that is determined to be representative of the biological system of interest to the RFI.

For each proposed investigation of flora and fauna, the Respondent shall provide information regarding the following:

a. Study objectives and relevance to overall risk assessment objectives. Study objectives may include documentation of actual or potential endangerment or effects to the environment, the definition of spatial and temporal extent of contamination to support the development of remediation criteria and evaluation of ecological effects of remedial alternatives in the CMS;

b. Proposed field or laboratory methods, with appropriate reference to Agency guidelines or other source;

c. Expected sampling locations (including detailed maps), sampling dates, and sample size;

d. Statistical methods to be used and data quality objectives to meet statistical significance criteria; and

e. Quality control procedures.

2. Tier 3 Ecological Assessment

If a Tier 3 Ecological Assessment is warranted, Respondent will perform assessment which represents a more quantitative and area-specific analysis than was developed in Tier 2.

3. Ecological Assessment Reports

The Respondent shall prepare a Ecological Assessment Reports after completing Tier 2 activities and revise the report after completing Tier 3 activities. Respondent shall submit the reports to the U.S. EPA. If Tier 3 activities are required, a Schedule for the Tier 3 Ecological Assessment will be provided in the Tier 2 Ecological Assessment Report. The following report outline shall be modified to account for the investigations actually undertaken at the facility.

Facility Characterization and Identification of Potential Receptors (include detailed maps where appropriate).

a. Physical description of the facility;

b. Nature and extent of contamination by medium and contaminant type; and

c. Potentially exposed habitats and species.

Problem Formulation

a. Contaminants of concern and rationale for selection; and

b. Ecological endpoints of concern and rationale for selection.

c. Conceptual Model

Exposure Assessment

a. Sources and exposure pathways of contaminants of concern;

b. Fate and transport analysis, including possible food chain transport;

c. Estimation of exposure point concentrations by habitat, species, and exposure scenario; and

d. Uncertainty analysis.

Toxicity Assessment

a. Toxicological properties of contaminants of concern;

b. Facility-specific toxicity tests--laboratory and/or *in situ*;

c. Existing toxicity-based criteria and standards; and

d. Uncertainty analysis.

Risk Characterization

a. Observed adverse effects in potentially exposed habitats compared to reference sites, such as (but not limited to) mortality (observed on-site or in toxicity tests), behavioral effects, presence or absence of key species, reproductive effects or altered community composition.

b. Analysis of contaminant concentrations in relation to observed adverse effects; and

c. Predicted (or observed) population-, community-, and ecosystem-level effects of observed effects.

d. Comparison of exposure point concentrations with relevant benchmark values. Possible additive, synergistic, or antagonistic effects or contaminant mixtures should be considered.

i) Comparison with appropriate criteria (such as ambient Water Quality Criteria) and standards (such as State Water Quality Standards); and

ii) Comparison with contaminant levels known to cause effects from published or peer-reviewed literature. Possible population-, community-, and ecosystem-level effects should be predicted based on these comparisons.

iii) Likely ecological risks associated with present and future land use scenarios.

iv) Ecological considerations in selecting remedial alternatives (including no action).

v) Uncertainty analysis.

The Respondent shall modify the Ecological Assessment Report(s) to incorporate changes required in U.S. EPA's comments and submit the Final Ecological Assessment Report for the facility to the U.S. EPA.

TASK V: SWMA RCRA FACILITY INVESTIGATION REPORTS

Respondent shall prepare analyses and conclusions of all SWMA investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and the environment, and to support the Corrective Measures Study.

A. Data Analysis

Respondent shall analyze all SWMA investigative data outlined in Task V and prepare a report on the type and extent of contamination at the SWMA including sources and migration pathways. The report shall describe the extent of contamination (qualitative/quantitative) in relation to the "critical value" indicative of the area.

B. Protection Standards

1. Groundwater Protection Standards

Respondent shall provide information to support the Agency's selection/development of Groundwater Protection Standards for all of the 40 CFR Part 264, Appendix IX constituents found in the groundwater during the SWMA Investigation (Task V).

a. The Groundwater Protection Standards shall consist of:

i) Maximum Contaminants Levels (MCLs) for constituents listed in the National Primary Drinking Water Regulations (40 CFR Part 141), if the naturally occurring background level of the constituent is below the given MCL; or

ii) A risk assessment, which shall, at a minimum, shall include the following criteria;

(1) Site/Contaminant characteristics;

(2) Contaminant transport pathways;

(3) Methods/Models to study transport rates and concentrations;

(4) Exposure Assessment;

(5) The "critical value" level of that constituent in the groundwater; or

iii) A U.S. EPA-approved Alternate Concentration Limit (ACL). Information to support the Agency's subsequent selection of ACL shall be developed by the Respondent in accordance with U.S. EPA guidance. For any proposed ACLs, Respondent shall include a justification based upon the criteria set forth in 40 CFR 264.94(b). The Respondent shall amend and submit revisions to the U.S. EPA within forty-five (45) days of receipt of the U.S. EPA's notification of disapproval of any proposed ACL.

b. The U.S. EPA shall notify Respondent in writing of approval, disapproval or modifications. The U.S. EPA shall specify in writing the reasons for any disapproval or modification.

2. Soil, Sediment, and Fill Protection Standards

   Respondent shall provide information to support the Agency's selection/development of Soil and Sediment Protection Standards for applicable 40 CFR Part 264, Appendix IX constituents found in the soils, fill, and sediments during the SWMA Investigation (Task V).

   a. The Soil, Fill, and Sediment Protection Standards shall consider the following information as applied to soil cleanup levels:

      i) Site/Contaminant characteristics;

      ii) Contaminant transport pathways;

      iii) Methods/Models to study transport rates and concentrations;

      iv) Exposure Assessment;

      v) Risk assessment; and

      vi) The critical value level of that constituent in the soil, fill, and sediment; or

   b. The U.S. EPA shall notify Respondent in writing of approval, disapproval or modifications. The U.S. EPA shall specify in writing the reasons for any disapproval or modification.

3. Other Relevant Protection Standards

   Respondent shall identify and consider all relevant and applicable standards or criteria for protection of human health and the environment (e.g., National Ambient Air Quality Standards, Federally-approved State water quality standards, water quality criteria, health advisories, proposed MCLs, etc.).

<u>TASK VI</u>: <u>REPORTS</u>

A. <u>Preliminary Reports and Workplans</u>

Respondent shall submit to the U.S. EPA reports on Task I by September 15, 1996. The Respondent shall submit the RFI workplan, Task II, one hundred eighty (180) days from the approval of the Task I report.

B. Progress Reports

Respondent shall at a minimum provide U.S. EPA with signed, brief, quarterly progress reports containing:

1. A description and estimate of the percentage of the SWMA investigation completed;

2. Summaries of all findings;

3. Summaries of all changes made in the SWMA investigation during the reporting period;

4. Summaries of all contacts pertaining to this Administrative Order with representatives of local community public interest groups or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in key personnel during the reporting period;

8. Projected work for the next reporting period; and

Copies of daily reports, inspection reports, laboratory/monitoring data, etc., will be maintained at the facility for review purpose.

C. Status Reports

Respondent shall at a minimum provide U.S. EPA with signed, brief, monthly status reports containing:

1. A list of activities initiated, undertaken, and completed during the month;

2. A list of activities, including field sampling, planned for the following month; and

3. A list of changes or deviations in planned activities made during the reporting period;

D. Draft and Final

Respondent shall prepare the one or more RCRA SWMA Investigation Reports which incorporate information developed in Task I, II, III, IV, and V for each SWMA. Such report(s) shall constitute the RFI Report required in section VIII.B of the Consent Order. The draft and final RCRA SWMA Investigation Report(s) shall be submitted in accordance with the schedule in the RFI Workplan. Each RCRA SWMA Investigation Report shall be developed in draft form for U.S. EPA review. Each RCRA SWMA Investigation Report shall be developed in final format incorporating comments received on the Draft RCRA SWMA Investigation Report. The SWMA Investigation report will be used to support the Corrective Measures Study for the SWMA, if needed and will identify each area for which a Corrective Measures Study (CMS) will be prepared.

Five (5) copies of all reports shall be provided by the Respondent to U.S. EPA.

TASK VII: COMPILATION OF RFI DATA AND REPORTS

During the execution of Tasks I through Task VI of the RFI, the Respondent will maintain at the facility a record of all documents pertaining to the RFI. A copy of the record will be provided to U. S. EPA upon request.

Facility Submittal Summary

A summary of the information reporting requirements contained in the RCRA Facility Investigation Scope of Work is presented below.

Facility Submittals	***Due Date***
Facility Hydrogeologic Assessment and Current Conditions Report (Task I)	The report was submitted on January 30, 1997
RFI Work Plan (Task II)	180 days from approval of the Task I Report
Facility Perimeter Zone Ground-Water Sampling Assessment Report (Task III)	As set forth in the RFI Workplan
RFI Sampling Plans for Individual SWMAs Task (IV)	As set forth in the RFI Workplan
Final and Draft SWMA Investigation Reports (Tasks V)	As set forth in the RFI Workplan
Quarterly Progress and Monthly Status Reports on Tasks I - V	Quarterly Progress Reports within 30 days after the end of the quarter and Monthly Status Reports within 15 days after the end of the month
Compilation of RFI Data and Reports	Upon Completion of Tasks I through VI

ATTACHMENT III
SCOPE OF WORK
INTERIM STABILIZATION MEASURES

AT

U.S. STEEL GARY WORKS
GARY, INDIANA

ATTACHMENT III

SCOPE OF WORK FOR INTERIM STABILIZATION MEASURES AT U.S. STEEL GARY WORKS

SECTION A. INTERIM STABILIZATION MEASURES WORKPLAN

I. ISM Objectives
II. Design Plans and Specifications
III. Health and Safety Plan
IV. Data Collection Quality Assurance Plan
V. Data Management Plan
VI. Public Involvement Plan
VII. Schedule

SECTION B. INTERIM STABILIZATION MEASURES IMPLEMENTATION PROGRAM

I. Final Design Documents
II. Operations and Maintenance Plan
III. Construction Quality Assurance Plan
IV. Schedule

SECTION C. REPORTS

I. Progress Reports
II. Draft ISM Report
III. Final ISM Report

SECTION D. SELF IMPLEMENTING STABILIZATION MEASURES

There are two types of measures incorporated into this attachment: Interim Stabilization Measures (ISMs) which is discussed in Sections A through C of this attachment and Self-Implementing Interim Stabilization Measure (SISMs) which is discussed in Section D. The overall goal of both measures is to control or abate imminent or potential threats to human health and the environment while long term remedies are pursued.

The ISMs will be used to mitigate releases of hazardous waste and/or hazardous constituents identified while conducting the corrective action process at the facility. For example, while implementing the RCRA Facility Investigation (RFI), the Respondent or U.S. EPA identifies an area where hazardous waste and/or hazardous constituent concentrations pose an imminent or potential threat to human health and the environment. An Interim Stabilization Measure ISM can be used to "stabilize" the potential source of contaminants.

Documentation shall be provided within the RFI Report as to whether an imminent or potential threat continues to exist from the area where a Stabilization Measure has been implemented. Respondent will propose in the RFI Report whether further CMS and CMI measures are required.

SECTION A. INTERIM STABILIZATION MEASURES WORKPLAN

In preparing the plans and reports required as part of the ISM Workplan, Respondent may incorporate by reference, relevant sections of previously approved documents, provided that Respondent shall specify any changes or additions to such sections which may apply to the ISM Workplan.

The ISM Workplan shall consist of items I through VII of Section A.

I. ISM Objectives

The Workplan shall specify the objectives of the ISMs, describe how the ISMs will abate releases and threatened releases, and to the extent possible, be consistent and integrated with any long-term solution at the facility. The ISM Workplan will include a discussion of the technical approach, engineering design strategy, conceptual budget, and schedules. The Workplan will also include a description of qualifications of personnel (excluding laborers and administrative staff) performing or directing the ISM(s), including contractor personnel. This plan shall also document the overall management approach to the ISM(s).

II. Design Plans and Specifications

The Respondent shall develop clear and comprehensive conceptual design plans and specifications appropriate to the ISM measure proposed which include but are not limited to the following:

A. Discussion of the design strategy and the design basis, including:

1. Compliance with all applicable or relevant environmental and public health standards; and

2. Minimization of environmental and public impacts.

B. Discussion of the technical factors of importance including:

1. Use of currently accepted environmental control measures and technology;

2. The constructability of the design; and

3. Use of currently acceptable construction practices and techniques.

C. Description of assumptions made in developing the design plans and justification of these assumptions;

D. Discussion of the possible sources of error and references to possible operation and maintenance problems;

E. Drawings of the proposed design including:

1. Qualitative and/or quantitative flow sheets;

2. Facility layout; and

3. Utility locations.

F. Tables listing materials, equipment and specifications;

G. Tables giving material balances;

H. Appendices including:

1. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

2. Results of laboratory or field tests.

General correlations between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications, the Respondent shall coordinate and cross-check the specifications and drawings and complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

III. <u>Health and Safety Plan</u>

Respondent shall revise the facility Health and Safety Plan if the RFI Workplan is approved to address the activities to be performed at the facility to implement the ISM. If the RFI Workplan is not yet approved then the Respondent shall provide a separate Health and Safety Plan for the ISM Activities.

A. Major elements of the Health and Safety Plan shall include:

1. A brief facility description, including availability of resources such as roads, water supplies, electricity and telephone services;

2. Describe the known hazards and evaluate the

health and safety risks associated with the incident and with each activity conducted;

3. List key personnel and alternates responsible for site safety, response operations, and for protection of human health;

4. Describe levels of protection to be worn by personnel;

5. Delineate work area;

6. Establish procedures to control site access;

7. Describe decontamination procedures for personnel and equipment;

8. Establish site emergency procedures;

9. Address emergency medical care for injuries and toxicological problems;

10. Describe requirements for an environmental surveillance program;

11. Specify any routine and special training required for responders;

12. Establish procedures for protecting workers from weather-related problems; and

13. Establish emergency procedures.

B. The Facility Health and Safety Plan shall be consistent with:

1. OSHA Indiana Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

2. U.S. EPA Order 1440.1 - Respiratory Protection;

3. U.S. EPA Order 1440.3 - Health and Safety

Requirements for Employees engaged in Field Activities;

4. Facility Contingency Plan;

5. U.S. EPA Standard Operating Safety Guide (1984);

6. OSHA regulations particularly in 29 CFR 1910 and 1926;

7. State and local regulations;

8. Other U.S. EPA guidance as provided; and

9. Facility Response Plan.

IV. <u>Data Collection Quality Assurance Plan (DCQAP)</u>

Respondent shall prepare a plan to document all monitoring procedures, sampling, field measurements and sample analyses performed during the investigation to characterize the environmental setting, source, and contamination, to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. Design support documentation will be provided in accordance with the requirements specified in Section B.

When appropriate, this plan will reference previously approved plan(s) per plan element. In the event a previously approved Quality Assurance Program Plan (QAPP) exists, Respondent shall reference the previously approved plan if it meets current QAPP requirements by plan element rather than reiterating consistent text. Respondent shall submit the plan specifying 1) what elements are the same as the previously approved plan by reference and 2) what changes and additions to the previously approved plan apply specifically to this ISM plan.

A. Data Collection Strategy

Respondent shall prepare a plan that describes the approach to data collection that results in data of adequate and appropriate documented technical quality for the purpose(s) intended. This DCQAP is to be used to ensure that Data Quality Objectives (DQOs) are defined and documented. The overall level of uncertainty that is acceptable will be defined as part of the DQO. DCQAP preparation will consider the value of the level of DCQAP documentation compared to the decisionmaking and confidence level needs from the results such that the data is of adequate technical quality for the RFI Corrective Action decisionmaking. The DCQAP components may vary in complexity based on the acceptable levels of uncertainty and decisionmaking needs associated with the goals of the activities to be undertaken.

The strategy section of the DCQAP shall include but not be limited to the following:

1. A description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

2. A description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

3. A description of the rationale used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Examples of factors which shall be considered and discussed include sampling and sample analysis.

B. Sampling

The Sampling section of the DCQAP shall discuss:

1. Selecting appropriate sampling locations, depths, etc.;

2. Providing a statistically sufficient number of sampling sites;

3. Measuring all necessary ancillary data;

4. Determining which media are to be sampled (e.g., groundwater, air, soil, sediment, etc.);

5. Determining which parameters are to be measured and where;

6. Selecting the frequency of sampling and length of sampling period;

7. Selecting the types of samples (e.g., composites vs. grabs) and number of samples to be collected;

8. Identify laboratory and analytical methodology as defined in DCQAP;

9. Identify sampling techniques; and

10. Documenting field sampling operations and procedures, including;

  a. Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);

  b. Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

  c. Documentation of specific sample preservation methods;

  d. Calibration of field devices;

  e. Collection of replicate samples;

  f. Submission of field-biased blanks, where appropriate;

  g. Potential interferences present at the facility;

  h. Construction materials and techniques, associated with monitoring wells and piezometers;

i. Field equipment and sample containers listing;

j. Sampling order; and

k. Decontamination procedures.

11. Selecting appropriate sample containers;

12. Sample preservation; and

13. Chain-of-custody, including:

a. Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

b. Pre-prepared sample labels containing all information necessary for effective sample tracking.

C. Sample Analysis

The Sample Analysis section of the DCQAP shall specify the following:

1. Chain-of-custody procedures, including:

a. Identification of a responsible party to act as sample custodian at the laboratory, who is authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

b. Provisions for a laboratory samples custody log consisting of serially numbered standard lab-tracking report sheets; and

c. Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

2. Sample storage;

3. Sample preparation methods;

4. Analytical procedures, including:

   a. Scope and application of the procedure;

   b. Sample matrix;

   c. Potential interferences;

   d. Precision and accuracy of the methodology; and

   e. Method detection limits.

5. Calibration procedures and frequency;

6. Data reduction, validation and reporting;

7. Internal quality control checks, laboratory performance and system audits and frequency, including:

   a. Method blank(s);

   b. Laboratory control sample(s);

   c. Calibration check sample(s);

   d. Replicate sample(s);

   e. Matrix-spiked sample(s);

   f. "Blind" quality control sample(s);

   g. Control charts;

   h. Surrogate samples;

i. Zero and span gases; and

j. Reagent quality control checks.

A performance audit may be conducted by U.S. EPA on the laboratories selected by the Respondent.

8. Preventative maintenance procedures and schedules;

9. Corrective action (for laboratory problems); and

10. Turnaround time.

V. Data Management Plan

Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

All groundwater data generated from the investigation shall be submitted in a computer accessible format, i.e., diskette. The format used shall be compatible with the U.S. EPA, Region 5 GRITS/STAT, *The Groundwater Information Tracking System/Statistical Analysis Capability, Appendix B.*

A. Data Record

The Data record shall include the following:

1. Unique sample or field measurement codes;

2. Sampling or field measurement location and sample or measurement types;

3. Sampling or field measurement raw data;

4. Laboratory analysis ID numbers;

5. Properties or components measured; and

6. Result of analysis (e.g., concentration).

B. Tabular Displays

The following data shall be presented in tabular displays:

1. Unsorted (raw) analytical data upon request by U.S. EPA;

2. Results for each medium, or for each constituent monitored;

3. Data reduction for numerical analysis;

4. Sorting of data by potential stratification factors (e.g., location, soil layer, topography);

5. Summary data;

6. Display contamination, levels, averages, and maxima; and

7. Display levels of contamination at each sampling location.

C. Graphical Displays

As determined by U.S. EPA, certain data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleths plots, cross-sectional plots or transects, three dimensional graphs, etc.). Color graphics will be provided if necessary to provide clarity:

1. Display sampling location and sampling grid;

2. Indicate boundaries of sampling area, and areas where more data are required;

3. Display levels of contamination at each sampling

location if necessary to provide clarity;

4. Display geographical extent of contamination;

5. Display contamination, levels, averages, and maxima if necessary to provide clarity;

6. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and

7. Indicate features affecting intramedia and intermedia transport showing potential receptors.

VI. Public Involvement Plan

Respondent shall prepare a plan for the dissemination of information to the public regarding ISM activities and results. These activities shall include the preparation and distribution of fact sheets and participation in public meetings.

VII. Schedule

Respondent shall provide a schedule for ISM activities which shall include, at a minimum, a schedule for conducting activities set forth in the ISM Workplan and a schedule for submittal of all documents required in Sections A and B.

SECTION B. INTERIM STABILIZATION MEASURES IMPLEMENTATION PROGRAM

Pursuant to the schedule set forth in the approved ISM Workplan, Respondent shall submit the documents required in Section B of this attachment.

I. Final Design Documents

Respondent shall finalize the initial design documents and specifications submitted with the ISM Workplan by submitting Final Design Documents which are sufficiently complete. In addition Respondent shall submit the following: the Operation and Maintenance Plan; the Construction Quality Assurance Plan; and the Project Schedule. The Respondent shall submit the final documents with reproducible drawings and specifications. The quality of the design documents should be such that the Respondent would be able to include them in a bid package and invite contractors to submit bids for the construction project.

II. Operation and Maintenance Plan

The Respondent shall prepare an Operation and Maintenance (O & M) Plan to cover both implementation and long-term maintenance of the ISM. When undertaken, the O & M Plan shall include a brief description of the strategy and key procedures for performing operations, maintenance, and/or monitoring of the ISM. The O & M Plan shall be submitted with the Final Design Documents. The plan shall be composed of the following elements:

A. Equipment start-up and operator training;

The Respondent shall prepare, and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the treatment systems; and training covering appropriate operational procedures once the start-up has been successfully accomplished.

B. Description of normal O & M;

1. Description of tasks for operation;

2. Description of tasks for maintenance;

3. Description of prescribed treatment or operation conditions;

4. Schedule showing frequency of each O&M task; and

5. Common and/or anticipated remedies.

C. Description of routine monitoring and laboratory testing;

1. Description of monitoring tasks;

2. Description of required laboratory tests and their interpretation;

3. Required quality assurance/quality control (QA/QC); and

4. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

D. Description of equipment;

1. Equipment identification;

2. Installation of monitoring components;

3. Maintenance of site equipment; and

4. Replacement schedule for equipment and installed components.

E. Description of types of records and reporting mechanisms required;

1. Daily operating logs;

2. Laboratory records;

3. Mechanism for reporting emergencies;

4. Personnel and maintenance records; and

5. Monthly/annual reports to Federal/State agencies.

Monitoring shall be performed on those ISMs to determine the effectiveness of the ISM to address the threat to human health and/or the environment. Monitoring shall continue until such time that a threat no longer exists. Monitoring may indicate the need for modifications and/or upgrading of the ISM. Such modifications and/or upgrading will be performed, as necessary to address the threat. Monitoring activities will be noted in the quarterly progress reports.

III. ISM CONSTRUCTION QUALITY ASSURANCE PLAN (CQAP)

A. Construction Quality Assurance Objectives

In the CQAP, the Respondent shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; and documentation. The responsibility and authority of all organizations; i.e., technical consultants, construction firms, etc., and key personnel involved in the construction of the ISMs, should be described in the CQAP. The Respondent must identify a CQAP officer and the necessary supporting inspection staff.

B. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the ISMs shall be summarized in the CQAP plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements directly associated with the ISM under construction to include, but not be limited to air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, the Respondent shall conduct the following activities:

1. Pre-construction inspection and meeting

The Respondent shall conduct a pre-construction inspection and meeting to:

a. Review methods for documenting and reporting inspection data;

b. Review methods for distributing and storing documents and reports;

c. Review work area security protocol and safety requirements;

d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

e. Conduct a site walk-through to verify that the design criteria, plans, and specifications are understood; and to review material and equipment storage locations.

The pre-construction inspection and meeting shall be documented by a designated person and minutes should be transmitted to all parties.

2. Pre-Final Inspection

Upon project completion, Respondent shall notify U.S. EPA for the purpose of conducting a pre-final inspection. The pre-final inspection will consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the U.S. EPA approved ISM. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by the Respondent, and will certify that the equipment performs to meet the purpose and intent of the specifications. Retesting will be done when deficiencies are noted. The pre-final inspection report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final Inspection

Upon completion of any outstanding construction items noted in the pre-final inspection, the Respondent shall notify U.S. EPA for the purpose of conducting a final inspection. The final inspection will consist of a walk-through inspection of the project site. The pre-final inspection will be used as a checklist with the final inspection focusing on the outstanding items that have not been resolved.

C. Sampling and Testing Requirements

The sampling and testing activities, sample size, sample and test locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems should be presented in the CQA.

D. Documentation

Reporting requirements for CQA activities shall be described in detail-in the CQA plan. This shall include such items as daily summary reports, inspection data sheets, problem identification and ISM reports, design acceptance reports, and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

IV. Project Schedule

The Respondent shall develop a detailed Project Schedule for construction and implementation of the ISM which identifies timing for initiation and completion of all critical path tasks. Respondent shall specifically identify dates for completion of the project and major interim milestones which are enforceable terms of this order. A Project Schedule shall be submitted simultaneously with the Final Design Documents.

SECTION C. REPORTS

I. Progress Reports

A. The Respondent shall submit monthly progress reports. These reports will begin within thirty (30) days following implementation of any ISM activities at a given location. The report will include:

1. A description and estimate of the percentage of the ISMs completed;

2. Summaries of all findings;

3. Summaries of all changes made in the ISMs during the reporting period;

4. Summaries of all contacts with representatives of the local community, public interest groups, or State government pertaining to the stabilization measure during the reporting period;

5. Summaries of problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Projected work for the next reporting period; and

8. SISM actions taken during the reporting period.

B. Copies of daily reports, inspection reports, laboratory/monitoring data, etc., will be maintained at the facility.

II. Draft ISM Report

Sixty (60) days after completion of the construction of the project, except for long-term operations, maintenance and monitoring, the Respondent shall submit an ISM Implementation Report to the Agency. The Report shall document that the project is consistent with the design specifications, and that the ISMs are performing adequately. The Report shall include, but not be limited to the following elements:

A. Synopsis of the ISMs and certification of the design and construction;

B. Explanation of any modifications to the plan and why these were necessary for the project;

C. Listing of criteria, established before the ISMs were initiated, for judging the functioning of the ISM and also explaining any modification to these criteria;

D. Results of facility monitoring, indicating that ISMs will meet or exceed the performance criteria; and

E. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

This report shall include all of the inspection summary reports, inspection data sheets, problem identification and corrective measure reports, and as-built drawings.

III. <u>Final ISM Report</u>

The Respondent shall finalize the Interim Measures Implementation Report incorporating comments received on draft submittals within thirty (30) days after receipt of U.S. EPA comments.

SECTION D. SELF IMPLEMENTING STABILIZATION MEASURES (SISMs)

SISMs may be used to mitigate releases of hazardous waste or hazardous constituents from past practices discovered during current business activities such as normal plant expansion or construction activities. A SISM may not be used to circumvent the corrective action process and are intended to apply only when time constraints do not allow for use of an ISM.

Where Respondent proposes a SISM, it shall submit to U.S. EPA a SISM Workplan which shall include the elements required for an ISM Workplan as set forth in Section A and shall submit the other submittals required in accordance with Section B in accordance with a schedule contained in the SISM Workplan.

Respondent shall submit the SISM Workplan to U.S. EPA at least thirty (30) days before work is to begin. U.S. EPA retains the right to require Respondent to cease work under the SISM Workplan before or after work has begun, and Respondent agrees to cease work immediately upon such notification. Where U.S. EPA has issued a notification to cease work in accordance with this paragraph, Respondent retains the right to propose an ISM in accordance with the procedures set forth in this Order. Unless U.S. EPA notifies Respondent otherwise, no further approval is necessary after thirty (30) days from submittal of the SISM Workplan.

Reporting requirements shall be as set forth in Section C of this attachment.

Facility Submittal Summary

A summary of the information reporting requirements contained in the ISM Scope of Work is present below:

Facility Submittals	Due Date
Interim Stabilization Measures Workplan	Within thirty (30) days after notification, as required in Section VIIIA2 of the Administrative Order.
ISM Implementation Documents	Schedule deliverable date provided in the approved ISM Workplan
Progress Reports	Monthly Progress Reports - The first report is due within forty-five (45) days after approval of the ISM Workplan
Draft ISM Report	Within sixty (60) days after completion of construction
Final Interim Measures Report	Within thirty (30) days after receipt of U.S. EPA comments on Draft Interim Measures Report

ATTACHMENT IV
SCOPE OF WORK
CORRECTIVE MEASURES STUDY

AT

U.S. STEEL GARY WORKS
GARY, INDIANA

ATTACHMENT IV

SCOPE OF WORK FOR A CORRECTIVE MEASURES STUDY AT U.S. STEEL GARY WORKS

PURPOSE

The purpose of the Corrective Measures Study (CMS) is to develop and evaluate the corrective action alternatives and to recommend the corrective measures to be taken at Solid Waste Management Area(s) (SWMA) at the U.S. Steel Gary Works facility (the Facility). Respondent shall furnish the personnel, materials, and services necessary to prepare the corrective measures study, except as otherwise specified.

Information developed during the Facility Hydrogeologic Assessment and Current Conditions Report (FHACCR), RCRA Facility Investigation (RFI) and during the implementation of any Interim Stabilization Measure (ISM) may be utilized during the development of the Corrective Measures Study. The number and type of remedial alternatives to be considered in the CMS may vary according to the complexity of SWMA characteristics.

SCOPE

The Respondent shall prepare and submit a schedule for the CMS for each SWMA which requires a Corrective Measures Study as identified in any approved SWMA RFI Report. The CMS consists of Tasks VIII through XI:

Task VIII: Development of CMS Schedule

Task VIIIA: Identification and Development of the Corrective Measure Alternatives

A. Description of Current Situation
B. Establishment of Corrective Action Objectives
C. Screening of Corrective Measure Technologies
D. Identification of the Corrective Measure Alternatives

Task IX: Necessary Laboratory and Bench-Scale Studies

Task X: Evaluation of the Corrective Measures Alternatives

A. Technical/Environmental/Human Health/Institutions
B. Cost Estimates

Task XI: Justification and Recommendation of the Corrective Measures

A. Technical
B. Environmental
C. Human Health
D. Institutional Controls

Task XII: Reports

A. Progress Reports
B. Status Reports
C. Draft Corrective Measures Study Report
D. Final Corrective Measures Study Report

TASK VIII: DEVELOPMENT OF CMS SCHEDULE

The Respondent shall prepare and submit a schedule for the CMS in the RFI Report for any SWMA. Respondent shall complete the CMS in accordance with this attachment and within the time period set forth in the RFI Report for any SWMA.

TASK VIIIA: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE MEASURE ALTERNATIVE OR ALTERNATIVES

Based upon the results of the RFI Report for any SWMA and consideration of the identified Preliminary Corrective Measure Technologies, Respondent shall identify, screen, and develop the alternatives for removal, containment, treatment, and/or other remediation of the contamination based on the objectives established for the corrective action.

A. Description of Current Conditions

Respondent shall include an update to the information describing the current conditions at the facility and the known nature and extent of the contamination as documented by the RFI Report. This update shall be sufficient to identify those issues which could affect the evaluation and selection of the corrective measure alternative. Respondent shall provide an update to the information presented in Task I of the FHACCR and RFI to the Agency regarding previous response activities and any interim measures which have been implemented at the facility. Respondent shall also make a SWMA-specific statement of the purpose for the response, based on the results of the RFI Report. The statement of purpose should identify and summarize the actual or potential exposure pathways and risks that should be addressed by corrective measures.

B. Establishment of Corrective Action Objectives

Respondent, in conjunction with the U.S. EPA, shall establish SWMA specific objectives for the corrective action needed to protect human health and the environment. These objectives shall be based on

Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

3. Technology Limitations

During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated on the screening process. For example, certain treatment methods have not been developed to a point where they can be implemented in the field without extensive technology transfer or development. These methods should be eliminated from further consideration.

D. **Identification of the Corrective Measure Alternatives**

Respondent shall develop the corrective measure alternatives based on the corrective action objectives and analysis of Preliminary Corrective Measure Technologies, as presented in Task I of the RFI, and as supplemented by the information in the RFI Report. Respondent shall rely on sound engineering practices to determine which of the previously identified technologies appear more suitable for the site. Technologies can be combined to form the overall corrective measure alternative(s). The alternative(s) developed should represent a workable number of options that appear to adequately address all SWMA-specific site problem(s) as identified in the RFI Report for any SWMA and corrective action objective(s). Each alternative may consist of an individual technology or a combination of technologies. Respondent shall document the reasons for excluding technologies identified in Task I, as well as those supplemental public health and environmental criteria, information gathered during the RFI, U.S. EPA guidance, and the requirements of any applicable Federal statutes. All corrective actions concerning releases must be protective of human health and the environment.

C. **Screening of Corrective Measure Technologies**

Respondent shall review the results of the RFI and assess the technologies identified in Task I to identify any additional technologies which are applicable at the facility. Respondent shall screen the preliminary corrective measure technologies identified in Task I of the RCRA Facility Investigation and any supplemental technologies, to eliminate those that are not feasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on elimination of those technologies which have limitations with respect to one or more of the waste-, technology-, and/or site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations. Site, waste, and technology characteristics which are used to screen technologies are described in more detail below:

1. Site Characteristics

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration.

2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process.

technologies identified in Task VIIIA Item C.

TASK IX: LABORATORY AND BENCH-SCALE STUDIES

The Respondent shall, as appropriate, conduct laboratory and/or bench-scale studies to determine the applicability of corrective measure technologies to facility conditions. Respondent shall analyze the technologies based on literature review, vendor contacts, and past experience to determine the testing requirements.

Respondent shall, develop a testing plan identifying the types and goals of the studies, the level of effort needed, and the procedures to be used for data management and interpretation.

Upon completion of the testing, Respondent shall evaluate the testing results to assess the technologies with respect to the site-specific corrective action objectives identified in the test plan.

Respondent shall prepare a report summarizing the testing program and its results.

TASK X: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES

Respondent shall briefly describe each corrective measure alternative that passes through the Initial Screening in Task VIIIA which warrant a more detailed evaluation and evaluate each for corrective measure alternative and its components. Each alternative may consist of an individual technology or a combination of technologies depending on the site-specific conditions. The evaluation shall be based on, at a minimum, technical, environmental, human health, and institutional concerns. Respondent shall also develop cost estimates for implementation of each corrective measure.

The evaluation shall guided by the standards and factors for the selection of corrective measures set forth in 55 Federal Register 30798 et seq (July 21, 1990).

A. **Technical/Environmental/Human Health/Institutional**

Respondent shall provide a brief description of each corrective measure alternative which includes, but is not limited to the following: preliminary process flow sheets; preliminary sizing and types of construction for buildings and structures; and estimated quantities of utilities required. Respondent shall evaluate at a minimum, each alternative in the four following areas:

1. Technical

Respondent shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. Respondent shall evaluate each corrective measure alternative based on the effectiveness and useful life of the corrective measure.

i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction or treatment. Possible factors which could potentially impede effectiveness include fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation, and re-disposal or containment of waste materials. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Performance evaluations shall be based on the relevant results of treatability studies and/or effectiveness of the alternative at other sites. Any specific waste-, technology- or site-specific characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies.

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure alternative shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

iii) Respondent may consider whether the technology or a combination of technologies have been used effectively under analogous site conditions, whether failure of any one technology in the alternative would have an immediate impact on receptors, and whether the alternative would have the flexibility to deal with uncontrollable changes at the site (e.g., heavy rain storms, tornados, etc.).

b. Respondent shall provide information on the reliability of each corrective measure including its operation and maintenance requirements and demonstrated reliability.

i) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered.

ii) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. Respondent should evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. Respondent shall describe the implementability of each corrective measure, including the relative ease of installation (constructability) and the time required to achieve a given level of response.

i) Constructability is determined by conditions both internal and external to the facility conditions, and includes such items as location of underground utilities, depth to water table, homogeneity of subsurface materials, and location of the facility (i.e., remote location vs. a congested manufacturing area). Respondent shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities.

ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure; and the time it takes to actually see beneficial results. Beneficial results are defined as containment and/or the reduction of contaminants to some acceptable, pre-established level.

d. Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as threats to workers during implementation. Factors to consider are fire, explosion and exposure to hazardous substances.

2. Environmental

Respondent shall assess each alternative to determine its short and long-term beneficial and adverse effects on the environment. Each alternative will be evaluated for its impact on habitat types and plant and animal receptors located in, adjacent to, or affected by the facility. Receptor impacts should include those occurring at the individual level (e.g., mortality, growth and reproductive impairments) and those occurring at higher levels of biological organization (i.e., at population, community, and ecosystem levels). Corrective action remedies must be protective of human health and the environment. The assessment should include proposed measures for mitigating adverse impacts.

3. Human Health

Respondent shall assess, based on qualitative and quantitative data, each alternative in terms of the extent to which it mitigates short and long-term potential exposure to any residual contamination and how it protects human health both during and after implementation of the corrective measure. The assessment should include proposed measures for mitigating adverse impacts. The assessment will describe the levels and characterizations of contaminants on-site, potential exposure routes, and the potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction of this exposure over time.

4. Institutional

Respondent shall assess relevant institutional needs for each alternative. Specifically, the Federal, State, and local environmental and public health standards, regulation, guidance, advisories, ordinances, or community relations impacts on the design, operation, and timing of each alternative.

Respondent shall briefly discuss how the specific waste management activities will be conducted in compliance with applicable institutional needs.

B. Cost Estimate

Respondent shall, based on sound engineering practice, develop an estimate of the cost of each corrective measure alternative, and for each phase or segment of the alternative. The Respondent may use U.S. EPA's Cost of Remedial Action (CORA) Model in the development of these cost estimates. The cost estimate shall consider both capital and operation and maintenance costs:

1. Capital costs consider direct (construction) and indirect (non-construction and overhead) costs.

   a. Direct capital costs include:

      i) Construction costs; Costs of materials, labor (including fringe benefits and worker's compensation) and equipment required to install the corrective measure;

      ii) Equipment costs: Cost of treatment, containment, disposal and/or service equipment necessary to implement the action;

      iii) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and

   b. Indirect capital costs include:

      i) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;

ii) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

iii) Startup and shakedown costs: Costs incurred during corrective measure startup; and

iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. Respondent shall consider the following operation and maintenance cost components:

   a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

   b. Maintenance materials and labor costs: Cost for labor, parts, and other resources required for routine maintenance of facilities and equipment;

   c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer services and fuel:

   d. Purchased services: Sampling costs laboratory fees, and professional fees for which the need can be predicted;

   e. Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;

f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or right-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds: Annual payments into escrow to cover: (1) costs of anticipated replacement or rebuilding of equipment; and (2) any large unanticipated operation and maintenance costs; and

i. Other costs: Items that do not fit any of the above categories.

TASK XI: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURES

Respondent shall justify and recommend corrective measure alternatives developed in Task X. The recommendation shall include summary tables which allow the alternatives to be easily understood. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The U.S. EPA will select the corrective measure alternatives to be implemented based on the results of Tasks IX and X. At a minimum, the following criteria will be used to justify the final corrective measures.

A. Technical

1. Performance - corrective measures which are most effective at performing their intended

functions and maintaining the performance over extended periods of time will be preferred.

2. Reliability - corrective measures which do not require frequent or complex operation and maintenance activities and that have been proven effective under waste and facility conditions similar to those anticipated will be preferred.

3. Implementability - corrective measures which can be constructed and operated to reduce levels of contamination that attain or exceed applicable standards in a reasonable period of time will be preferred.

4. Safety - corrective measures which pose the least threat to the safety of nearby residents and the environment, as well as workers during implementation will be preferred.

B. Human Health

The corrective measures must comply with existing U.S. EPA criteria and standards, and must consider existing guidelines or objectives established in accordance with Task VIIIA Item B of the CMS Scope of Work for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure over time will be preferred.

C. Environmental

The correct measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be preferred.

D. Institutional Controls

Respondent shall assess the effect of relevant institutional needs for such alternative.

TASK XII: REPORTS

Respondent shall prepare a CMS Report(s) presenting the results of Tasks VIIIA through XI and recommending corrective measure alternative(s) with respect to each SWMA. The Draft and Final CMS Reports shall be submitted in accordance with the schedule as discussed in Task VII. Five copies of all reports, including the Draft and Final CMS report shall be provided by the Respondent to U.S. EPA.

A. Progress Reports

Respondent shall at a minimum provide U.S. EPA with signed, brief, quarterly progress reports containing:

1. A description and estimate of the percentage of the CMS completed;

2. Brief summaries of all findings during the reporting period;

3. Brief summaries of all changes made in the CMS during the reporting period;

4. Brief summaries of all contacts with representatives of the local community, public interest groups, or State government associated with RCRA Corrective Action during the reporting period;

5. Brief summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in key personnel during the reporting period; and

8. Projected work for the next reporting period,

Copies of daily reports, inspection reports. laboratory/monitoring data, etc., will be maintained at the facility for review purposes.

B. Status Reports

Respondent shall at a minimum provide U.S. EPA with signed, brief, monthly status reports containing:

1. A list of activities initiated, undertaken, and completed during the month;

2. A list of activities planned for the following month; and

3. A list of changes made during the reporting period;

C. Draft Corrective Measures Study Report(s)

Each report(s) shall at a minimum, include:

1. A description of the facility, including a site topographic map (which, as appropriate includes depiction of plant communities and fish and wildlife habitat types) and preliminary layouts;

2. A summary of the corrective measures:

   a. Description of the corrective measures and rationale for selection;

   b. Performance expectations;

   c. Preliminary design criteria and rationale;

   d. General operation and maintenance requirements; and

   e. Long-term monitoring requirements to assess attainment of corrective action objectives relative to groundwater, surface waters, and ecological integrity (ecological monitoring, where applicable, could include assessment of wetland vegetation, soils and hydrology; biotoxicity of surface waters, soils and/or sediments: analysis of biological tissues; and assessment of stream fish and benthic macroinvertebrate communities;

3. A summary of the RFI and impact on the selected corrective measures;

4. A summary of any necessary laboratory and bench-scale studies;

5. Design and Implementation Precaution:

    a. Special technical problems;

    b. Additional engineering data required;

    c. Permits and regulatory requirements;

    d. Access, easements, right-of-way;

    e. Health and safety requirements; and

    f. Community relations activities; and

6. Cost Estimates and Schedules;

    a. Capital cost estimate and/or operation and maintenance cost estimate based on sound engineering practice; and

    b. Project schedule {design, construction, operation}.

D. **Final Corrective Measures Study Report(s)**

Respondent shall finalize the Corrective Measures Study Report, addressing comments received from the public, and U.S. EPA on the Draft Final Corrective Measures Study Report, or as otherwise provided for in the Alternative Dispute Resolution provisions of this Order.

Facility Submittal Summary

A summary of the information requirements contained in the Corrective Measure Study Scope of Work is presented below:

Facility Submittal	**Due Date**
CMS Schedule (TASK VIII)	The date the RFI Report for any SWMA is submitted
Draft CMS Report (Task VIIIA IX, X, and XI)	As set forth in the schedule contained in the RFI Report for any SWMA
Final CMS Report (Tasks VIIIA, IX. X, and XI)	As set forth in the schedule contained in the RFI Report for any SWMA
Progress and Status Reports on Tasks VIII through XI	Quarterly Progress Reports and Monthly Status Reports

ATTACHMENT IV
SCOPE OF WORK
CORRECTIVE MEASURES STUDY

AT

U.S. STEEL GARY WORKS
GARY, INDIANA

ATTACHMENT IV

SCOPE OF WORK FOR A CORRECTIVE MEASURES STUDY AT U.S. STEEL GARY WORKS

PURPOSE

The purpose of the Corrective Measures Study (CMS) is to develop and evaluate the corrective action alternatives and to recommend the corrective measures to be taken at Solid Waste Management Area(s) (SWMA) at the U.S. Steel Gary Works facility (the Facility). Respondent shall furnish the personnel, materials, and services necessary to prepare the corrective measures study, except as otherwise specified.

Information developed during the Facility Hydrogeologic Assessment and Current Conditions Report (FHACCR), RCRA Facility Investigation (RFI) and during the implementation of any Interim Stabilization Measure (ISM) may be utilized during the development of the Corrective Measures Study. The number and type of remedial alternatives to be considered in the CMS may vary according to the complexity of SWMA characteristics.

SCOPE

The Respondent shall prepare and submit a schedule for the CMS for each SWMA which requires a Corrective Measures Study as identified in any approved SWMA RFI Report. The CMS consists of Tasks VIII through XI:

Task VIII: Development of CMS Schedule

Task VIIIA: Identification and Development of the Corrective Measure Alternatives

A. Description of Current Situation
B. Establishment of Corrective Action Objectives
C. Screening of Corrective Measure Technologies
D. Identification of the Corrective Measure Alternatives

Task IX: Necessary Laboratory and Bench-Scale Studies

Task X: Evaluation of the Corrective Measures Alternatives

A. Technical/Environmental/Human Health/Institutions
B. Cost Estimates

Task XI: Justification and Recommendation of the Corrective Measures

A. Technical
B. Environmental
C. Human Health
D. Institutional Controls

Task XII: Reports

A. Progress Reports
B. Status Reports
C. Draft Corrective Measures Study Report
D. Final Corrective Measures Study Report

TASK VIII: DEVELOPMENT OF CMS SCHEDULE

The Respondent shall prepare and submit a schedule for the CMS in the RFI Report for any SWMA. Respondent shall complete the CMS in accordance with this attachment and within the time period set forth in the RFI Report for any SWMA.

TASK VIIIA: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE MEASURE ALTERNATIVE OR ALTERNATIVES

Based upon the results of the RFI Report for any SWMA and consideration of the identified Preliminary Corrective Measure Technologies, Respondent shall identify, screen, and develop the alternatives for removal, containment, treatment, and/or other remediation of the contamination based on the objectives established for the corrective action.

A. **Description of Current Conditions**

Respondent shall include an update to the information describing the current conditions at the facility and the known nature and extent of the contamination as documented by the RFI Report. This update shall be sufficient to identify those issues which could affect the evaluation and selection of the corrective measure alternative. Respondent shall provide an update to the information presented in Task I of the FHACCR and RFI to the Agency regarding previous response activities and any interim measures which have been implemented at the facility. Respondent shall also make a SWMA-specific statement of the purpose for the response, based on the results of the RFI Report. The statement of purpose should identify and summarize the actual or potential exposure pathways and risks that should be addressed by corrective measures.

B. **Establishment of Corrective Action Objectives**

Respondent, in conjunction with the U.S. EPA, shall establish SWMA specific objectives for the corrective action needed to protect human health and the environment. These objectives shall be based on public health and environmental criteria, information gathered during the RFI, U.S. EPA guidance, and the requirements of any applicable Federal statutes. All corrective actions concerning releases must be protective of human health and the environment.

C. **<u>Screening of Corrective Measure Technologies</u>**

Respondent shall review the results of the RFI and assess the technologies identified in Task I to identify any additional technologies which are applicable at the facility. Respondent shall screen the preliminary corrective measure technologies identified in Task I of the RCRA Facility Investigation and any supplemental technologies, to eliminate those that are not feasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on elimination of those technologies which have limitations with respect to one or more of the waste-, technology-, and/or site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations. Site, waste, and technology characteristics which are used to screen technologies are described in more detail below:

1. Site Characteristics

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration.

2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process.

Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

3. Technology Limitations

During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated on the screening process. For example, certain treatment methods have not been developed to a point where they can be implemented in the field without extensive technology transfer or development. These methods should be eliminated from further consideration.

D. **Identification of the Corrective Measure Alternatives**

Respondent shall develop the corrective measure alternatives based on the corrective action objectives and analysis of Preliminary Corrective Measure Technologies, as presented in Task I of the RFI, and as supplemented by the information in the RFI Report. Respondent shall rely on sound engineering practices to determine which of the previously identified technologies appear more suitable for the site. Technologies can be combined to form the overall corrective measure alternative(s). The alternative(s) developed should represent a workable number of options that appear to adequately address all SWMA-specific site problem(s) as identified in the RFI Report for any SWMA and corrective action objective(s). Each alternative may consist of an individual technology or a combination of technologies. Respondent shall document the reasons for excluding technologies identified in Task I, as well as those supplemental technologies identified in Task VIIIA Item C.

TASK IX: LABORATORY AND BENCH-SCALE STUDIES

The Respondent shall, as appropriate, conduct laboratory and/or bench-scale studies to determine the applicability of corrective measure technologies to facility conditions. Respondent shall analyze the technologies based on literature review, vendor contacts, and past experience to determine the testing requirements.

Respondent shall, develop a testing plan identifying the types and goals of the studies, the level of effort needed, and the procedures to be used for data management and interpretation.

Upon completion of the testing, Respondent shall evaluate the testing results to assess the technologies with respect to the site-specific corrective action objectives identified in the test plan.

Respondent shall prepare a report summarizing the testing program and its results.

TASK X: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES

Respondent shall briefly describe each corrective measure alternative that passes through the Initial Screening in Task VIIIA which warrant a more detailed evaluation and evaluate each for corrective measure alternative and its components. Each alternative may consist of an individual technology or a combination of technologies depending on the site-specific conditions. The evaluation shall be based on, at a minimum, technical, environmental, human health, and institutional concerns. Respondent shall also develop cost estimates for implementation of each corrective measure.

The evaluation shall guided by the standards and factors for the selection of corrective measures set forth in 55 Federal Register 30798 et seq (July 21, 1990).

A. Technical/Environmental/Human Health/Institutional

Respondent shall provide a brief description of each corrective measure alternative which includes, but is not limited to the following: preliminary process flow sheets; preliminary sizing and types of construction for buildings and structures; and estimated quantities of utilities required. Respondent shall evaluate at a minimum, each alternative in the four following areas:

1. Technical

Respondent shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. Respondent shall evaluate each corrective measure alternative based on the effectiveness and useful life of the corrective measure.

i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction or treatment. Possible factors which could potentially impede effectiveness include fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation, and re-disposal or containment of waste materials. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Performance evaluations shall be based on the relevant results of treatability studies and/or effectiveness of the alternative at other sites. Any specific waste-, technology- or site-specific characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies.

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure alternative shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

iii) Respondent may consider whether the technology or a combination of technologies have been used effectively under analogous site conditions, whether failure of any one technology in the alternative would have an immediate impact on receptors, and whether the alternative would have the flexibility to deal with uncontrollable changes at the site (e.g., heavy rain storms, tornados, etc.).

b. Respondent shall provide information on the reliability of each corrective measure including its operation and maintenance requirements and demonstrated reliability.

i) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered.

ii) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. Respondent should evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. Respondent shall describe the implementability of each corrective measure, including the relative ease of installation (constructability) and the time required to achieve a given level of response.

i) Constructability is determined by conditions both internal and external to the facility conditions, and includes such items as location of underground utilities, depth to water table, homogeneity of subsurface materials, and location of the facility (i.e., remote location vs. a congested manufacturing area). Respondent shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities.

ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure; and the time it takes to actually see beneficial results. Beneficial results are defined as containment and/or the reduction of contaminants to some acceptable, pre-established level.

d. Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as threats to workers during implementation. Factors to consider are fire, explosion and exposure to hazardous substances.

2. Environmental

Respondent shall assess each alternative to determine its short and long-term beneficial and adverse effects on the environment. Each alternative will be evaluated for its impact on habitat types and plant and animal receptors located in, adjacent to, or affected by the facility. Receptor impacts should include those occurring at the individual level (e.g., mortality, growth and reproductive impairments) and those occurring at higher levels of biological organization (i.e., at population, community, and ecosystem levels). Corrective action remedies must be protective of human health and the environment. The assessment should include proposed measures for mitigating adverse impacts.

3. Human Health

Respondent shall assess, based on qualitative and quantitative data, each alternative in terms of the extent to which it mitigates short and long-term potential exposure to any residual contamination and how it protects human health both during and after implementation of the corrective measure. The assessment should include proposed measures for mitigating adverse impacts. The assessment will describe the levels and characterizations of contaminants on-site, potential exposure routes, and the potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction of this exposure over time.

4. Institutional

Respondent shall assess relevant institutional needs for each alternative. Specifically, the Federal, State, and local environmental and public health standards, regulation, guidance, advisories, ordinances, or community relations impacts on the design, operation, and timing of each alternative.

Respondent shall briefly discuss how the specific waste management activities will be conducted in compliance with applicable institutional needs.

B. Cost Estimate

Respondent shall, based on sound engineering practice, develop an estimate of the cost of each corrective measure alternative, and for each phase or segment of the alternative. The Respondent may use U.S. EPA's Cost of Remedial Action (CORA) Model in the development of these cost estimates. The cost estimate shall consider both capital and operation and maintenance costs:

1. Capital costs consider direct (construction) and indirect (non-construction and overhead) costs.

   a. Direct capital costs include:

      i) Construction costs; Costs of materials, labor (including fringe benefits and worker's compensation) and equipment required to install the corrective measure;

      ii) Equipment costs: Cost of treatment, containment, disposal and/or service equipment necessary to implement the action;

      iii) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and

   b. Indirect capital costs include:

      i) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;

ii) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

iii) Startup and shakedown costs: Costs incurred during corrective measure startup; and

iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. Respondent shall consider the following operation and maintenance cost components:

   a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

   b. Maintenance materials and labor costs: Cost for labor, parts, and other resources required for routine maintenance of facilities and equipment;

   c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer services and fuel:

   d. Purchased services: Sampling costs laboratory fees, and professional fees for which the need can be predicted;

   e. Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;

f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or right-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds: Annual payments into escrow to cover: (1) costs of anticipated replacement or rebuilding of equipment; and (2) any large unanticipated operation and maintenance costs; and

i. Other costs: Items that do not fit any of the above categories.

TASK XI: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURES

Respondent shall justify and recommend corrective measure alternatives developed in Task X. The recommendation shall include summary tables which allow the alternatives to be easily understood. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The U.S. EPA will select the corrective measure alternatives to be implemented based on the results of Tasks IX and X. At a minimum, the following criteria will be used to justify the final corrective measures.

A. Technical

1. Performance - corrective measures which are most effective at performing their intended

functions and maintaining the performance over extended periods of time will be preferred.

2. Reliability - corrective measures which do not require frequent or complex operation and maintenance activities and that have been proven effective under waste and facility conditions similar to those anticipated will be preferred.

3. Implementability - corrective measures which can be constructed and operated to reduce levels of contamination that attain or exceed applicable standards in a reasonable period of time will be preferred.

4. Safety - corrective measures which pose the least threat to the safety of nearby residents and the environment, as well as workers during implementation will be preferred.

B. <u>Human Health</u>

The corrective measures must comply with existing U.S. EPA criteria and standards, and must consider existing guidelines or objectives established in accordance with Task VIIIA Item B of the CMS Scope of Work for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure over time will be preferred.

C. <u>Environmental</u>

The correct measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be preferred.

D. <u>Institutional Controls</u>

Respondent shall assess the effect of relevant institutional needs for such alternative.

TASK XII: REPORTS

Respondent shall prepare a CMS Report(s) presenting the results of Tasks VIIIA through XI and recommending corrective measure alternative(s) with respect to each SWMA. The Draft and Final CMS Reports shall be submitted in accordance with the schedule as discussed in Task VII. Five copies of all reports, including the Draft and Final CMS report shall be provided by the Respondent to U.S. EPA.

A. Progress Reports

Respondent shall at a minimum provide U.S. EPA with signed, brief, quarterly progress reports containing:

1. A description and estimate of the percentage of the CMS completed;

2. Brief summaries of all findings during the reporting period;

3. Brief summaries of all changes made in the CMS during the reporting period;

4. Brief summaries of all contacts with representatives of the local community, public interest groups, or State government associated with RCRA Corrective Action during the reporting period;

5. Brief summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in key personnel during the reporting period; and

8. Projected work for the next reporting period,

Copies of daily reports, inspection reports. laboratory/monitoring data, etc., will be maintained at the facility for review purposes.

B. <u>Status Reports</u>

Respondent shall at a minimum provide U.S. EPA with signed, brief, monthly status reports containing:

1. A list of activities initiated, undertaken, and completed during the month;

2. A list of activities planned for the following month; and

3. A list of changes made during the reporting period;

C. <u>Draft Corrective Measures Study Report(s)</u>

Each report(s) shall at a minimum, include:

1. A description of the facility, including a site topographic map (which, as appropriate includes depiction of plant communities and fish and wildlife habitat types) and preliminary layouts;

2. A summary of the corrective measures:

   a. Description of the corrective measures and rationale for selection;

   b. Performance expectations;

   c. Preliminary design criteria and rationale;

   d. General operation and maintenance requirements; and

   e. Long-term monitoring requirements to assess attainment of corrective action objectives relative to groundwater, surface waters, and ecological integrity (ecological monitoring, where applicable, could include assessment of wetland vegetation, soils and hydrology; biotoxicity of surface waters, soils and/or sediments: analysis of biological tissues; and assessment of stream fish and benthic macroinvertebrate communities;

3. A summary of the RFI and impact on the selected corrective measures;

4. A summary of any necessary laboratory and bench-scale studies;

5. Design and Implementation Precaution:

   a. Special technical problems;

   b. Additional engineering data required;

   c. Permits and regulatory requirements;

   d. Access, easements, right-of-way;

   e. Health and safety requirements; and

   f. Community relations activities; and

6. Cost Estimates and Schedules;

   a. Capital cost estimate and/or operation and maintenance cost estimate based on sound engineering practice; and

   b. Project schedule {design, construction, operation}.

D. <u>**Final Corrective Measures Study Report(s)**</u>

Respondent shall finalize the Corrective Measures Study Report, addressing comments received from the public, and U.S. EPA on the Draft Final Corrective Measures Study Report, or as otherwise provided for in the Alternative Dispute Resolution provisions of this Order.

Facility Submittal Summary

A summary of the information requirements contained in the Corrective Measure Study Scope of Work is presented below:

Facility Submittal	**Due Date**
CMS Schedule (TASK VIII)	The date the RFI Report for any SWMA is submitted
Draft CMS Report (Task VIIIA IX, X, and XI)	As set forth in the schedule contained in the RFI Report for any SWMA
Final CMS Report (Tasks VIIIA, IX. X, and XI)	As set forth in the schedule contained in the RFI Report for any SWMA
Progress and Status Reports on Tasks VIII through XI	Quarterly Progress Reports and Monthly Status Reports

ATTACHMENT V
SCOPE OF WORK
CORRECTIVE MEASURE IMPLEMENTATION

AT

U.S. STEEL GARY WORKS
GARY, INDIANA

ATTACHMENT V

SCOPE OF WORK FOR
THE CORRECTIVE MEASURE IMPLEMENTATION
AT U.S. STEEL GARY WORKS

PURPOSE

The purpose of the Corrective Measures Implementation (CMI) program is to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures approved by U.S. EPA with respect to a Solid Waste Management Area (SWMA). The Respondent will furnish all personnel, materials, and services necessary for the implementation of the corrective measures.

SCOPE

The CMI program shall consist of five tasks:

TASK XIII: Corrective Measure Implementation Program Plan

A. Program Management Plan
B. Public Involvement Plan

TASK XIV: Corrective Measure Design

A. Design Plans and Specifications
B. Operation and Maintenance Plan
C. Cost Estimate
D. Project Schedule
E. Construction Quality Assurance Objectives
F. Health and Safety Plan
G. Design Phases

TASK XV: Corrective Measures Construction

A. Responsibility and Authority
B. Construction Quality Assurance Personnel Qualifications
C. Inspection Activities
D. Sampling Requirements
E. Documentation

TASK XVI: Performance Monitoring Requirements of Corrective Measures

TASK XVII: Other Reports and Submissions

A. Progress Reports
B. Status Reports
C. Draft Submittals
D. Final Submittals
E. Corrective Measure Implementation Report
F. Corrective Measure Completion Report

TASK XIII: CMI PROGRAM PLAN

The Respondent shall prepare and submit a CMI Program Plan for each corrective measure selected by U.S. EPA with respect to any SWMA. This program plan will include the development and implementation of several plans, which shall be prepared concurrently. The CMI Program Plan includes the following:

A. Program Management Plan

The Respondent shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of Corrective Measures for U.S. EPA review and approval. The Plan shall describe the remediation approach to be applied to the corrective measure. The Plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Program Management Plan shall also include a description of qualifications of key personnel directing the Corrective Measure Design and Implementation, including contractor personnel. The Respondent shall submit a final CMI Program Plan incorporating U.S. EPA's comments on the Draft CMI Program Plan according to the schedule identified in the Submission Schedule.

B. Public Involvement Plan

The Respondent shall revise the Public Involvement Plan from the FHACCR and RCRA Facility Investigation to include any changes in the level of concern and/or of information needs of the community during design and construction activities.

1. Specific activities which must be conducted during the design stage are as follows:

   a. Revise the facility Public Involvement Plan to reflect knowledge of citizen concerns and involvement at this stage of the process; and

   b. Prepare and distribute a public notice and an updated fact sheet at the completion of the engineering design.

5. Sufficiently detailed drawings of the proposed design, including:

   a. Qualitative flow sheets; and/or

   b. Quantitative flow sheets.

6. Tables listing equipment and specifications;

7. Tables giving material and energy balances;

8. Appendices including:

   a. Equations essential to understanding calculations within the report with example calculations; and

   b. Results of laboratory or field tests.

B. **<u>Operation and Maintenance Plan</u>**

The Respondent shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of the Corrective Measures, if applicable. An initial Draft Operation and Maintenance Plan shall be submitted simultaneously with the Pre-Final Design Document submission and the Final Operation and Maintenance Plan shall be submitted with the Final Design documents. The plan shall include the following elements:

1. Description of normal operation and maintenance (O&M):

   a. Description of tasks for operation;

   b. Description of tasks for maintenance;

   c. Description of prescribed treatment or operation conditions; and

   d. Schedule showing frequency of each significant O&M task.

2. Description of potential operating problems:

   a. Description and analysis of potential operation problems;

2. Depending on the community interest at the facility at this point in the corrective action process, public involvement activities could range from group meetings to fact sheets on the technical issues.

TASK XIV: CORRECTIVE MEASURE DESIGN

The Respondent shall prepare construction plans and specifications in sufficient detail to implement the Corrective Measures at the SWMA which have been selected by U.S. EPA.

A. Design Plans and Specifications

The Respondent shall, as appropriate, develop clear and comprehensive design plans and specifications in the Draft Design which include but are not limited to the following:

1. Discussion of the design strategy and the design basis, including:

   a. Compliance with all applicable or relevant environmental and public health standards; and

   b. Minimization of environmental and public impacts.

2. Discussion of the technical factors of importance, including:

   a. Use of currently accepted environmental control measures and technology;

   b. The feasibility of the design; and

   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

b. Sources of information regarding problems; and

c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing:

a. Description of monitoring tasks;

b. Description of required laboratory tasks and their interpretation;

c. Required data collection, laboratory Quality Assurance Project Plan (QAPjP);

d. Schedule of monitoring frequency; and

e. Description of triggering mechanisms for ground water/surface water monitoring results.

4. Description of alternate O&M:

a. Should systems fail, alternate procedures to prevent releases or threatened releases of hazardous substances, pollutants or contaminants which may endanger human health and the environment or exceed cleanup standards should be developed.

b. Analysis of vulnerability should be conducted and additional resource requirements determined if a failure occurs.

5. Corrective Steps:

a. Description of corrective steps to be implemented in the event that performance standards are not met; and

b. Schedule for implementing the corrective steps.

6. Safety Plan:

a. Description of precautions, of necessary equipment, etc., for site personnel; and

b. Safety tasks required in event of systems failure.

7. Description of Equipment:

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment; and

d. Replacement schedule for equipment and installed components.

8. Records And Reporting Mechanisms Required:

a. Daily operating logs;

b. Laboratory records;

c. Records for operating costs;

d. Mechanism for reporting emergencies;

e. Personnel and maintenance records; and

f. Quarterly/annual reports and Monthly status reports to appropriate State agencies, as requested by U.S. EPA.

The O & M Plan shall also include Corrective Measure Completion Criteria.

C. **Cost Estimate**

The Respondent shall refine the cost estimate developed in the Corrective Measure Study to reflect the more detailed/accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs. An initial Cost Estimate shall be submitted simultaneously with the Draft Design submission and the Final Cost Estimate shall be submitted with the Final Design Document. The Respondent may use U.S. EPA's Cost of Remedial Action (CORA) Model in the development of these cost estimates.

D. Project Schedule

The Respondent shall develop a project schedule for construction and implementation of the Corrective Measures which identifies timing for initiation and completion of all critical path tasks. Respondent shall specifically identify dates for completion of the project and major interim milestones. An initial project schedule shall be submitted simultaneously with the Draft Design Document submission and the Final Project Schedule shall be submitted with the Final Design Document.

E. Construction Quality Assurance Plan

The Respondent shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements and documentation. Draft Construction Quality Assurance Objectives shall be submitted simultaneously with the Draft Design Submission and the Final Construction Quality Assurance Objectives shall be submitted following U.S. EPA approval of the Final Design Document. The draft plan shall address all tasks in Task XV.

F. Health and Safety Plan

The Respondent shall submit a Health and Safety Plan to address the activities to be performed at the facility to implement the Corrective Measures.

Design Phases

The Respondent shall confer as necessary with U.S. EPA to discuss design issues. The design of the Corrective Measures shall include the phases outlined below. If after submittal of the preliminary design or draft design, Respondent demonstrates that no further design work is necessary, U.S. EPA may approve such request. If U.S. EPA approves the request, the approval will not affect the submittal of any other submittals required under this attachment.

1. Preliminary Design

   The Respondent shall submit the preliminary design when its effort is approximately 30% complete according to the Submission Schedule. At this stage, the Respondent shall have existing field conditions verified at the facility. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable Corrective Measure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program.

   The preliminary construction drawings by the Respondent shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications. The Respondent shall include with their preliminary submission, design calculations reflecting the same percentage of completion as the design they support. Pre-design work, if required by U.S. EPA, shall be reported at this time.

2. Draft Design

   The Respondent shall submit the Draft Design according to the schedule in the Submission Schedule. The submission shall be at 60 to 80% completion of the design. After approval of the Draft Design submission, the Respondent shall execute the required revisions and submit the final design with reproducible drawings and specifications.

   The Draft design submittal shall consist of the Draft Design Plans and specifications, Operation and Maintenance Plan, Capital and Operating and Maintenance Cost Estimate, Project Schedule, Construction Quality Assurance Objectives and Specifications for the Health and Safety Plan.

3. The Respondent shall prepare, and include in the technical specifications governing

treatment systems, contractor requirements for providing appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the treatment systems, and training covering appropriate operational procedures once the start-up has been successfully accomplished.

4. Final Design

The Respondent shall submit a Final Design according to the schedule in the Submission Summary. The final Design consists of the Final Design Documents, including Plans and Specifications, the Respondent's Final Construction Cost Estimate, the Final Operation and Maintenance Plan, Construction Quality Assurance Objectives, Final Project Schedule and Final Health and Safety Plan Specifications. The Final Design documents shall be of sufficient detail to adequately implement all corrective measure activities, to permit adequate oversight, and to be of sufficient quality to invite contractors to submit bids.

5. Additional Studies

The U.S. EPA and Respondent may determine that additional studies are appropriate to supplement the available technical data regarding design and/or modification of practical corrective measures. Such additional studies would be consistent with the overall Corrective Action Process. The Respondent shall furnish all equipment and personnel necessary to complete any additional work needed. Draft and final reports shall be prepared presenting all data obtained during the additional studies, a brief summary of the results and conclusions.

TASK XV: CORRECTIVE MEASURE CONSTRUCTION

The Respondent shall finalize the Construction Quality Assurance Plan incorporating comments received on the draft Construction Quality Assurance Plan submitted with the Draft Design. Within forty-five (45) days of U.S. EPA approval of the final design or earlier design approval, the Respondent shall implement a Construction Quality Assurance (CQA) program to ensure, with a reasonable degree of certainty, that a completed Corrective Measure will meet or exceed all design criteria, plans and specifications. The CQA plan is a facility specific document which must be approved by U.S. EPA prior to the start of the construction. At a minimum the CQA plan should include the elements which are summarized below. In accordance with the schedule as approved in the Final Design Documents, the Respondent shall initiate the construction process and implement the Corrective Measures in accordance with the approved design, schedule and CQA plan. Respondent shall also implement the elements of the approved operation and maintenance plan.

A. **Responsibility and Authority**

The Respondent shall describe fully in the CQA Plan the responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the corrective measure. The Respondent shall identify a CQA Plan. The Respondent shall also identify a CQA officer and the necessary supporting inspection staff.

B. **Construction Quality Assurance Personnel Qualifications**

The Respondent shall set forth the qualifications of the CQA Officer and supporting inspection personnel shall be presented in the CQA plan to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.

C. **Inspection Activities**

The Respondent shall summarize in the CQA plan the observations and tests that will be used to monitor the construction and/or installation of the components of the Corrective Measures. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with environmental requirements specific to the Corrective Measure construction being undertaken and include, but not be limited to, air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection shall also ensure compliance with all corrective measure construction health and safety procedures. In addition to the oversight inspections, the Respondent shall conduct the following activities:

1. Preconstruction inspection and meeting

   The Respondent shall notify U.S. EPA of the intended construction start date and may at U.S. EPA's discretion, conduct a preconstruction inspection and meeting. The purpose of this preconstruction inspection and meeting shall be:

   a. Review methods for documenting and reporting inspection data;

   b. Review methods for distributing and storing documents and reports;

   c. Review work area security protocol and safety requirements;

   d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

   e. Conduct a site walk-around to verify that the design criteria, plans and specifications are understood and to review material and equipment storage locations. The preconstruction inspection and meeting shall be documented by a designated person and minutes shall be transmitted to all parties.

2. Pre-Final Inspection

   Upon preliminary project completion, Respondent shall notify U.S. EPA for the purposes of conducting a pre-final inspection. The pre-final inspection shall consist of a walk-through inspection of the areas requiring corrective measures. The inspection is to confirm whether the project is complete and consistent with the contract documents and the U.S. EPA approved Corrective Measure Study. Any outstanding construction noted during the inspection shall be identified and recorded noted. Additionally, prior to, or during the inspection, treatment equipment shall be operationally tested by Respondent. The Respondent shall certify that the equipment has performed to meet the purpose and intent of the corrective measures. Retesting will be completed where deficiencies are revealed. The Respondent shall outline in the pre-final inspection report the outstanding construction items, actions required to resolve items, completion data for these items and date for final inspection.

3. Final Inspection

Upon completion of any outstanding construction items, the Respondent shall notify U.S. EPA for the purposes of conducting a final inspection. The final inspection shall consist of a walk-through inspection of the project site. The pre-final inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the pre-final inspection. Confirmation shall be made that outstanding items have been resolved.

D. Sampling Requirements

The Respondent shall present in the CQA plan the sampling activities, sample size, sample locations, frequency of testing, criteria for acceptance and rejection and plans for correcting problems as addressed in the project specifications.

E. Documentation

The Respondent shall describe in detail in the CQA plan the reporting requirements for CQA activities. This shall include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports and final documentation. Provisions for the final storage of all records shall be presented in the CQA plan.

TASK XVI: PERFORMANCE MONITORING REQUIREMENTS FOR CORRECTIVE MEASURE

The Respondent shall prepare a Performance Monitoring Plan which will document the overall performance monitoring strategy for the corrective measure(s). The plan shall be submitted for review and approval to the U.S. EPA. The Performance Monitoring Plan shall address monitoring of the implemented corrective measure(s) to determine if the corrective measure(s) is operating in accordance with the conceptual model developed for the SWMA, and the goals (i.e., corrective action objectives) as established in the CMS. Performance monitoring shall also be consistent with standard engineering practice associated with the approved corrective measure technology. Performance monitoring may consist of monitoring physical and/or chemical parameters so that the data gathered are valid (which may require statistical validation depending upon the data), technically sound, and properly validated.

Termination criteria shall also be developed as part of the Performance Monitoring Plan. The termination criteria shall be consistent with the risk based goals established in the corrective action objectives and based on practical technology limitations associated with the implemented corrective measure.

TASK XVII: OTHER REPORTS AND SUBMISSIONS

The Respondent shall prepare plans, specifications and reports as set forth in Tasks XIV through Task XVI to document the design, construction, operation, maintenance and monitoring of the Corrective Measure. Other documentation shall include, but not be limited to the following:

A. Progress Reports

The Respondent shall at a minimum provide the U.S. EPA with signed, quarterly progress reports during the design and construction phases and semi-annual progress reports for operation and maintenance activities containing:

1. A description and estimate of the percentage of the CMI completed;

2. Brief summaries of all findings during the reporting period;

3. Brief summaries of all changes made in the CMI during the reporting period;

4. Brief summaries of all contact with representatives of the local community, public interest groups of State government pertaining to the CMI during the reporting period;

5. Brief summaries of problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

Copies of daily reports, inspection reports, laboratory/monitoring data, etc. will be maintained at the facility for review purposes.

B. Status Reports

Respondent shall at a minimum provide U.S. EPA with signed, monthly status reports containing:

1. A list of activities initiated, undertaken, and completed during the previous month;

2. A list of activities planned for the following month; and

3. A list of changes made during the reporting period;

C. Corrective Measure Implementation Report

At the completion of construction and start-up, the Respondent shall submit a Corrective Measure Implementation Report to the Agency. The report shall document that the project is consistent with the design specifications, and that the corrective measure is functioning as designed. The Report shall include, but not be limited to the following elements:

1. Synopsis of the corrective measure and certification of the design and construction;

2. Explanation of any modifications to the plans and why these were necessary for the project;

3. Listing of the criteria, established before the remedial action was initiated, for judging the functioning of the remedial action and also providing explanation of any modification to these criteria;

4. Results of facility monitoring, indicating that the remedial action will meet or exceed the performance criteria;

5. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility; and

6. Data demonstrating that the Protection Standards have been achieved.

D. <u>**Corrective Measures Completion Report**</u>

The Respondent shall prepare a Corrective Measure Completion (CMC) Report when the Respondent believes the corrective measure completion criteria have been satisfied. The purpose of the CMC Report is to fully document how the corrective measure and/or monitoring may cease. The CMC Report shall, at a minimum, include the following elements:

1. Purpose;

2. Synopsis of the corrective measure;

3. Corrective Measure Completion Criteria: Describe the process and criteria for determining when corrective measures, maintenance and monitoring may cease. Corrective measure completion criteria were given in the final Operation and Maintenance Plan;

4. Demonstration that the completion criteria have been met. Include results of testing and/or monitoring, indicating how operation of the corrective measure compares to the completion criteria;

5. Summary of work accomplishments (e.g. performance levels achieved, total hours of treatment operation, total treated and/or excavated volumes, nature and volume of wastes generated, etc.);

6. Summary of significant activities that occurred during operations. Include a discussion of problems encountered and how they were addressed;

7. Summary of inspection findings (include copies of key inspection documents in appendices); and

8. Summary of total operation and maintenance costs.

Submission Schedule

The Respondent shall comply with the information reporting requirements presented below.

Facility Submission	Date Due
Draft Program Plans (Task XIII)	90 days after U.S. EPA final selection of Corrective Measures for any SWMA
Final Program Plan (Task XIII)	60 days after receipt of U.S. EPA comments on draft Program Plan
Design Phases (Task XIV) -Preliminary Design	Schedule as provided in the approved Program Plan
-Draft Design	Schedule as provided in the approved Program Plan
-Final Design	Schedule as provided in the approved Program Plan
Draft Submittals	Concurrent with submittal of Draft Design
Final Submittals	Concurrent with Submittal of Final Design
Draft Construction Quality Assurance Plan (Task XV)	Prior to construction
Final Construction Quality Assurance Plan (Task XV)	60 days after US EPA comment on Draft Construction Quality Assurance Plan
Construction of Corrective Measures	As approved in Final Design
Draft Design Inspection Report (Task XV)	30 days after Pre-Final Inspection

Facility Submission	Date Due
Draft Corrective Measure Implementation Report (Task XV)	As approved in the Final Design
Final Corrective Measure Implementation Report (Task XV)	60 days after receipt of U.S. EPA comments on draft CMI Report
Performance Monitoring Plan (Task XVI)	To be submitted with approved Task XIV
Program Reports for Tasks XIII through XVI	Quarterly Reports and Monthly Status Reports
Reports during Operation and Maintenance	Semi-annual
Corrective Measure Completion Report	When Corrective Measure Completion Criteria have been satisfied