

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

<i>Project Name</i>	<u>GRAND CALUMET RIVER</u>	<i>ProjectID:</i> 05-07
<i>Last Updated:</i>	06/14/04	
<i>City:</i>	Gary	
<i>County:</i>	Porter	
<i>State:</i>	IN	
<i>Country:</i>	USA	
<i>Bodies of Water:</i>	Grand Calumet River (east branch and a small segment of the west branch); Indiana Harbor Canal	
<i>US EPA Region:</i>	V	
<i>Status (Active, Complete, or Monitoring Only):</i>	Complete	
<i>Date On NPL:</i>	N/A	
<i>ROD/ESD Date:</i>	N/A	
<i>Operable Unit:</i>	N/A	
<i>Areas of Concern (length or acres):</i>	Sediments in a 5-mile stretch of the Grand Calumet River located primarily on U.S. Steel Gary Works property and to the south of the active steel working facility.	
<i>Other Characteristics of Water Body:</i>	The river width varies between 35 and 170 feet (avg. of 100 feet); it is narrower at its headwaters and gradually increases in width moving from upstream to downstream. Water depth before dredging varied from 0 to about 4 feet and average water velocity was 3 feet per second. Total river flow is 375 million gallons per day (mgd) with up to 75 mgd being discharged from the U.S. Steel Gary Works plant. A 1984 USGS study concluded that 93% of dry weather flow of the Grand Calumet is municipal and industrial effluent and results in the river never freezing over.	
<i>Contaminants of Concern:</i>	PAH's, PCBs (primarily 1254); metals	
<i>Source of Contamination:</i>	The source of the contaminants are numerous and include: nonpoint source runoff from industrial waste sites, CERCLA sites and Resource Conservation and Recovery Act hazardous waste sites; more than 150 leaking underground storage tanks; atmospheric deposition; urban runoff; contaminated groundwater; industrial and municipal wastewater discharges; and combined sewer overflows. Of the 43 Great Lakes AOCs, Grand Calumet/Indiana Harbor is the only one in which all fourteen beneficial uses are impaired. Up to 70 % of the sediment in some places along the river is iron, deposited from wastewater discharged from the U.S. Steel Gary Works plant.	
<i>Contaminated Area Physical Characteristics:</i>	The east branch of the river originates at Marquette Park Lagoon, east of the U.S. Steel Gary Works facility. The east branch flows 10.5 miles where it joins the river's west branch, after which the river flows into the Indiana Harbor Canal. Sediments within the 5-mile stretch of river along the U.S. Steel Gary Works site reportedly contained an average PCB concentration of 17 ppm (350 ppm max.) and an estimated total PCB mass of 6.6 tons. Other COCs and their estimated mass include: (1) total BTEX - 27 tons; benzene - 14 tons; (2) total PAHs - 2,000 tons; (3) carcinogenic PAHs - 220 tons; (4) total heavy metals - 1,600 tons; (5) cyanide - 140 tons; and (6) iron - 10,000 tons.	
<i>Type of Regulatory Action:</i>	1998 Clean Water Act Consent Decree and 1998 Facility-wide RCRA Corrective Action Order.	
<i>Overall Status Summary:</i>	The Statement of Work attached to the 1998 Corrective Action Order specified five miles of river to be dredged of an estimated 687,000 cy of sediment that would be landfilled within a 40-acre Corrective Action Management Unit (CAMU) constructed by U.S. Steel (a subsidiary of USX Corporation) on U.S. Steel Gary Works property. The dredging plan proposed the use of cofferdams and flow diversion in the first mile, where the river is narrower with more stable	

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Project Name

GRAND CALUMET RIVER

ProjectID: 05-07

Last Updated:

06/14/04

banks, and floating dredges for the remaining four miles. The target was to remove “non-native sediment” down to 20-foot depth, maximum.

Planning for the project spanned 12 years. The total project cost is \$41 million; this includes only the Earth Tech contract awarded in about February 2001. Prior to this, Montgomery Watson was contracted to U.S. Steel and had begun preliminary work on the project including initial dredging design and submittal of a 60% design completion report for the CAMU to U.S. Steel; these costs are not included in the \$41 million.

The dredging was proposed as a result of the sediment in the five miles of river closest to the U.S. Steel Gary Works facility being heavily contaminated with PAHs and relatively high levels of PCBs. The ingestion of PCB-contaminated fish is the primary human health risk at the site. Sediment contaminant concentrations are greatest in the upstream sectors of the river and gradually decrease moving downstream.

Detailed project design performed in 2001 increased the target volume of sediment for removal to 750,000 cy (including non-native sediment, a six-inch over-dredge allowance, and removal of soft side slough material) and required the use of three cofferdam areas (each one-half mile long) in the most heavily contaminated upper 1½ miles of river and open water dredging in the remaining 3½ miles. The five miles of river were further divided into 36 transects with spacing that varies from 500 to 1,000 feet as part of an earlier characterization study. Project design and bidding were completed in early 2001. Bids received for CAMU construction and dredging reportedly ranged from \$35 to \$70 million.

Site preparation activities began in January 2002 and construction of the CAMU began in March 2002. The CAMU was constructed with two units: a 10-acre Unit 1 for the disposal of TSCA and RCRA regulated wastes (primarily the estimated 125,000 cy of contaminated sediment to be removed from the upper 1½ miles of river) and a 26-acre Unit 2 for disposal of sediment removed from the lower 3½ miles of river. Installation of the CAMU outer berms and Unit 1 liner system were completed in November 2002 and the Unit 2 liner system was completed in February 2003. The water treatment system was constructed and the three cofferdams installed in the upper 1½ miles of river during this same period. The water treatment system began operating in March 2003 following the start of open water dredging. Additionally, sheetpile installation was performed along select areas of the river within the cofferdam areas. The sheetpile was installed to increase bank stabilization following dredging of these areas.

Dredging was accomplished in the upper 1½ miles with an 8-inch hydraulic cutterhead dredge and in the lower 3½ miles with a 12-inch hydraulic cutterhead dredge. Dredging began with the removal of 11,000 cy of sediment from Transect 17 Horizon 1 (a localized area of sediment with elevated levels of contaminants in the lower 3½ miles of river) from December 4 – 18, 2002. This was followed by the start of open water dredging in the remaining lower 3½ miles of river on February 25, 2003, which continued until approximately the end of October 2003. Dredging in the cofferdam areas began on March 20, 2003 following the installation of the sheetpile for bank stabilization and continued intermittently until approximately the end of November 2003.

Final sediment removal volume was 788,000 cy and the final project cost was \$50.9 million (total for 13 years; includes design, permitting, construction, WTP operation and dredging).

Remedial Action Planned:



Risk Assessment:



GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name **GRAND CALUMET RIVER** ***ProjectID:*** 05-07

Last Updated: 06/14/04

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

References: ☒

Modeling: ☐

Fishing Advisory: ☒

Key Conditions: dedicated landfill or CDF, dredging, extended (>1 mile) river, Great Lakes AOC, wetlands

REMEDIAL ACTION PLANNED

Project Name	<u>GRAND CALUMET RIVER</u>	ProjectID: 05-07
Last Updated:	01/05/04	
Target Sediment Cleanup Standards (TSCS):	None. Plan is to remove "non-native sediments" down to a natural horizon.	
How TSCS Established:		
Target Bank and Floodplain Cleanup Levels (if applicable):	N/A	
Other Target:	50 ppm PCBs in Transects 1 - 11, 17 (Horizon 1), 20, 32 and 34	
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment:• Water:• Fish:	
Estimated Target Volume:	687,000 cy sediment (559,000 cy non-native sediment; 38,000 cy six-inch over-dredging; and 90,000 cy soft-sides); increased to 750,000 cy in the final design documents.	
Planned Disposal Method:	Dredged slurry is to be conveyed via pipeline to Corrective Action Management Unit (CAMU) located on USS property; sediment will be passively dewatered within the CAMU. CAMU is a bermed area of 36 acres and planned to consist of 2 cells; volume of Cell 1 is targeted to be 265,000 cy and volume of Cell 2 is targeted to be 1.44 million cy. Dredge fill rates for Cells 1 and 2 will be 3,000 and 6,000 gpm, respectively. Cell 1 will be dedicated for the most contaminated material, removed from the first one to 1.5 miles. CAMU will be designed as a RCRA Sub-title "C" facility; a geo-synthetic clay liner will be installed to allow dredged material to be placed 10 ft. "below the water table."	
Estimated Calendar Time to Implement Remedy:	<ol style="list-style-type: none">1. Design, permit application, and negotiations with PRPs in progress;2. CAMU construction targeted for 1999 and 2000;3. Dredging to be performed in 2001 and 2002.4. Post-remediation monitoring to begin in 2005.	
Estimated Time to Implement Remedy:	Two years, at 12 hours of dredging per day.	
Estimated Cost to Implement Remedy:	\$30 million; \$22 million already spent on disposal facility; not clear if the \$30 million includes any additional disposal facility costs.	
Stated Remedial Action Objectives (and Source):	(Source: Reference A-920) "To perform U.S. EPA-approved Interim Stabilization Measure(s) at the Facility to relieve imminent or potential threats to human health or the environment."	
Measures of Success to be Used:		
Planned Monitoring and Restoration:	The following are 1998 Consent Decree requirements: <ul style="list-style-type: none">• Treat and monitor CAMU effluent waters prior to discharge through permitted river outfalls.• Quantify post-dredge residual PCBs at isolation cells (Transects 1-11), Transects 17, 20, 32 and 34.	

REMEDIAL ACTION PLANNED

Project Name

GRAND CALUMET RIVER

ProjectID: 05-07

Last Updated:

01/05/04

- Conduct upstream and downstream water column monitoring during dredging operation.
- Perform pre- and post-dredging surveys to verify sediment removal.
- Implement a compensatory wetland mitigation plan.
- Implement a post-remediation monitoring program to evaluate the effect of the project on the ecosystem.

***Agency Position on Sediment
Removal (and Source):***

RISK ASSESSMENT

Project Name **GRAND CALUMET RIVER**

ProjectID: 05-07

Last Updated: 09/11/98

RA Type: Human Health Baseline

RA Status: Complete

RA Objectives: Estimate carcinogenic risks for complete exposure pathways using risk assessment protocols adapted from the US EPA superfund program.

Company EVS Consultants

Performing RA:

RA Reference Report: Reference B-132

RA Summary and Conclusions: Under typical exposure scenarios, the carcinogenic risk from consumption of carp (whole) was 2×10^{-5} and for golden shiners (whole) was 1×10^{-5} . For reasonable maximum exposure scenarios, the carcinogenic risks increase to 1×10^{-3} and 7×10^{-4} , respectively.

REMEDIAL ACTION IMPLEMENTED

Project Name:	<u>GRAND CALUMET RIVER</u>	ProjectID: 05-07
Last Updated:	06/14/04	
Physical Target:	750,000 cy of non-native sediment.	
Goals:	Remove all non-native sediment from a 5-mile section (Transects 1 - 36) of the river and reach a residual PCB concentration of 50 ppm in Transects 1 - 11, 17 (Horizon 1), 20, 32, and 34.	
Primary Contractor:	J.F. Brennan Company, Inc. (dredging and in-water operations; Earth Tech (design contractor and out-of-water operations)	
Other Contractors:		
Generic Remediation Method:	Hydraulic dredging	
Equipment:	Barge-mounted backhoe equipped with grapple for debris removal; land-based backhoe operated on mats for heavy vegetation removal; 12-inch swinging ladder hydraulic cutterhead dredge equipped with a single-wall HDPE discharge pipe for open-water dredging and a single shore-based 12-inch booster pump (where needed); 8-inch swinging ladder hydraulic cutterhead dredge equipped with a double-wall HDPE discharge pipe (8-inch pipe within a 12-inch pipe) and three barge-mounted 8-inch booster pumps (where necessary); small tug; johnboats for transport of personnel and equipment; four river bypass pumps; and three small cranes. In the lower 3½ miles of river, a three-part water quality control system comprising (1) a floating debris boom, (2) an oil boom, and (3) a turbidity curtain is being maintained at 2,000 to 3,000 ft downstream of the dredge across the full width of the river.	
Material Handling:	<p>Dredging was performed in the upper-most five-mile sector of the river. The river was divided primarily into two separate sectors for dredging: (1) the upper-most 1½ miles which contained a majority of the most highly contaminated sediment; this river section was further divided into three cofferdam sectors, each approximately ½ mile in length, that were completely isolated from the river downstream and each other, and (2) the lower 3½ miles of river. Additionally, the lower 3½-mile sector contained four areas of more highly contaminated sediment that were addressed separately from the remainder of the sediment in this area of the river. Four 16-inch booster pumps were used to bypass river flow around the cofferdam areas through a 36-inch header pipe, discharging the flow back to the river just below the downstream most cofferdam. The discharge end of the header pipe was attached by ropes to a small deck barge that also acted as a hydraulic dissipater to reduce the impact of the concentrated discharge flow on the river. The bypass pumps operated 24 hours per day, 7 days per week.</p> <p>Debris removal was performed in-river and along shorelines for about three months prior to the start of dredging. Debris continued to be an issue throughout dredging, although not to the extent originally anticipated. Debris was removed using a barge-mounted excavator and was disposed of in the CAMU Unit 1 cell. Most debris encountered had accumulated in areas easily accessible to the public, such as bridge overpasses.</p> <p>Dredging was performed 24 hours per day, 6 days per week using two 12-hour shifts. There was no dredge downtime during shift changes. Dredging was the only operation that occurred during night shift; dredge support operations (i.e., routine equipment maintenance, refueling, discharge pipe assembly/disassembly) were scheduled for day shift only. There were as many as 125 persons working on the site at any one time.</p> <p>Nearly all dredging in the lower 3½ miles of river was performed using the 12-inch dredge that removed sediment using a single dredge pass and discharged directly to the CAMU Unit 2. The dredge was capable of reaching bank-to-bank in a single pass. This dredge averaged 205 cy per hr operating at approximately 4,000 gpm and pumping between 1.5 to 2.0 miles, and removed a total</p>	

REMEDIAL ACTION IMPLEMENTED

Project Name:	<u>GRAND CALUMET RIVER</u>	ProjectID: 05-07
Last Updated:	06/14/04	
	<p>663,000 cy. Reportedly, the dredge initially discharged to the CAMU via 12,000 to 15,000 feet of single-wall pipe equipped with one in-line booster pump; the length of discharge pipe was reduced to about 10,000 feet as dredging moved toward the CAMU, eliminating the need for the booster pump. [Note: the pumping distance and the length of single-walled pipe came from two different sources and require reconciliation do determine which is most correct.]</p> <p>The 8-inch dredge was used in the upper 1½ mile cofferdam areas and in one section (Transect 17, Horizon 1) located in the lower 3½ miles of river. Two dredge passes were used to remove the sediment, the first pass was used to remove the bulk of the sediment and the second pass was performed as a cleanup pass. The dredge was able to reach bank-to-bank during each dredge pass. This dredge averaged 205 cy per hr operating at approximately 1,400 gpm and pumping between 2.0 to 3.5 miles, and removed a total 125,000 cy. The dredge discharged to the CAMU via about 15,000 feet of double-walled HDPE pipe equipped with three in-line booster pumps approximately equally spaced along the length of the pipe. The dredge contractor designed a special flange to allow connection of the double-wall discharge pipes to the booster pumps. Dredging in the cofferdam area periodically produced floating oil and a sheen, black dredge-induced turbidity (likely from elevated PAH levels), and an oily sludge accumulation on the in-water section of dredge discharge line.</p>	
Volume Removed:	788,000 cy	
Calendar Time:	Project: January 2002 to December 2003 Dredging: 2 weeks in December 2002, then February 25 to the end of November 2003	
Time To Implement:	Project: 23 months Dredging: 9 ½ months	
Total Cost:	\$50.9 million (total for 13 years; includes design, permitting, construction, WTP operation and dredging)	
Dredging Cost:		
Disposal of Sediment:	<p>The CAMU is approximately 36 acres in area and is divided into a 10-acre Unit 1 for disposal of RCRA and TSCA materials and 26-acre area for disposal of non-RCRA, non-TSCA materials. The CAMU was designed with excess capacity to accommodate further remedial work to be performed at the U.S. Steel Gary Works facility. CAMU construction began in March 2002 and was completed in February 2003. Berms are constructed of sand mixed with limekiln dust and incorporate layers of both uniaxial and biaxial geogrids to achieve the design 1H:1V side slopes.</p> <p>Dredge slurry from the river cofferdam areas was discharged to the 10-acre Unit 1 cell; supernatant water from the Unit 1 cell was pumped to a holding tank and allowed to return via gravity flow back to the cofferdam area being dredged to maintain minimum water levels within the cofferdam during dredging. Dredge slurry generated in the lower 3½ miles of the river was discharged to the 26-acre Unit 2 cell; supernatant water from the Unit 2 cell was sent directly to the water treatment plant for treatment prior to return to the river.</p> <p>Most debris removed from the river, and water treatment sludge, was disposed in the Unit 1 cell.</p>	
Volume of Water:		
Method of Water Treatment:	One volume of river water from each of the three cofferdam areas was treated following the completion of dredging using a 160 gpm treatment system comprising a plate settling chamber with polyaluminum chloride and polymer addition, followed by sand and bag filtration, then a polishing step utilizing two activated carbon adsorbers. This system is permanent and will be used to treat	

REMEDIAL ACTION IMPLEMENTED

Project Name: GRAND CALUMET RIVER

ProjectID: 05-07

Last Updated: 06/14/04

leachate collected from the CAMU following its closure and as part of long-term maintenance.

Water was continuously removed from the 26-acre Unit 2 cell from four feet below the water surface at a rate approximating the discharge flow from the 12-inch dredge (maximum design capacity was 5,000 gpm). The water was treated in two settling chambers that utilized the addition of ferric chloride, polymer, and fine sand to promote floc formation and increase settling efficiency. This treatment system was temporary and is to be dismantled when dredging is complete.

Sludge from both systems was disposed of in the CAMU.

Water Discharge Limit: Effluent from both water treatment units was discharged to an existing NPDES-permitted U.S. Steel Gary Works outfall for discharge back to the river. Reportedly, the released effluent consistently met the NPDES discharge limits.

Air Monitoring During Remediation: Five air sampling locations were established, two between the CAMU and residences, one between the CAMU and the US Steel facility, one south of the cofferdam dredge area, and one mobile station along the river bank that tracked the open-water dredging. The sampling frequency during dredging was daily for one week, thereafter two times per month. Monitoring was for BTEX constituents, naphthalene, and PCBs. Action levels were established for each. The PCB action level was 1,000 ng/m³.

During Summer 2003 there were air exceedances at the CAMU for naphthalene and benzene. Powdered, activated carbon was applied to the water surface for mitigation, which proved effective. The PCB action level was not exceeded during the project.

Water Monitoring During Remediation: A 401 Water Quality Certification issued by the State of Indiana was required for dredging the river. Daily water samples were collected from four primary locations: (1) a fixed upstream location, for background, located near mid-channel in the upper 1½ cofferdam area; (2) a variable downstream location, positioned at mid-channel and 200 yards downstream of the dredge in the lower 3½ miles of river; (3) a fixed location, located at mid-channel at the CSX Bridge downstream of the extent of dredging; and (4) a variable upstream location, positioned at mid-channel and 200 yards upstream of the dredge in the lower 3½ miles of river. Automated equipment was used to collect and analyze water samples at the two fixed locations; grab samples were collected from the variable location positions.

Three levels of water quality monitoring were required: (Level 1) daily monitoring of a standard list of parameters including flow, total ammonia, specific conductance, dissolved oxygen, pH, sulfides, temperature, and turbidity; (Level 2) biological monitoring using Microtox®, every other day for acute and twice monthly for chronic toxicity; and (Level 3) once per month sampling and analysis for a larger list of parameters including those monitored daily plus dissolved metals, semi-volatile organic compounds, PCBs, and total mercury.

Reportedly, exceeding one or more water quality criterion would trigger the need to reduce in-water levels below the criterion by modifying the dredge operations (e.g., slowing dredging operations, installing additional water quality control booms or curtains, temporarily suspending dredging, or increasing water sampling).

Water quality criteria were exceeded only once during dredging, in June or July 2003, for the compounds fluorine and fluoranthene. No other water quality exceedances were recorded during the project.

Outcome: An estimated 725,000 cy of sediment were removed from the river. Sediment removal verification in the lower 3½ miles of river was primarily by comparing pre- and post-dredge bathymetry data taken

REMEDIAL ACTION IMPLEMENTED

Project Name: GRAND CALUMET RIVER

ProjectID: 05-07

Last Updated: 06/14/04

from the same river station. Verification sample collection was not required. Additionally, a sediment removal target level of 50 ppm PCBs was established in the areas of heaviest contamination which included within the upper 1½ miles of cofferdam areas, and in four transects within the lower 3½ miles. A total of 48 verification samples was collected and analyzed.

Within the cofferdam areas, three verification samples were collected at each of four transects equally spaced along the length of the river sector (12 samples total). Each sample was analyzed and the results of each sample group (i.e., 12 samples within a cofferdam area or 4 samples within one of the four transects in the lower 3½ miles of river) were evaluated by statistically comparing the mean and Upper Confidence Limit (UCL) to the 50 ppm PCB removal target level. If the results exceeded 50 ppm PCBs, the individual (discrete) samples could be analyzed and the results subjected to more detailed statistical analysis to determine if further dredging was required. Verification sample results have yet to be obtained for this Database.

U.S. Steel also took steps to mitigate noise, but it is unclear if any project-specific standards were imposed. U.S. Steel has reportedly installed engineered mufflers on the dredges and booster pumps and has also reportedly constructed enclosures for the booster pumps to direct sound away from residential areas. Sound level measurements that have been obtained periodically are summarized as follows:

At hydraulic dredge: 95-98 decibels (background at same location 53-60)
North river bank, opposite dredge: 81 decibels (background 70-80)
South river bank, opposite dredge: 75 decibels (background 53-56)
On shore, at street intersection: 53 decibels (background 53)
At booster pump, inside enclosure: 103 decibels (background 53-60)
At booster pump, outside enclosure: 83-94 decibels (background 53-60)

Restoration and Post-Monitoring:

Implementation of the remedy required restoration of a relatively small area of wetlands that was disturbed as part of the dredging. Details on post-monitoring have yet to be obtained.

Site-Specific Difficulties:

- An assessment of river bank stability following dredging was performed during the project. Results of the assessment indicated unstable conditions would result from the dredging of non-native sediments in close proximity to certain sections of the riverbanks. Approximately 3,000 ft. of cantilevered sheet-pile was installed within sections of the cofferdam areas to maintain adequate bank stability.
- The spuds on the 12-inch dredge required lengthening to allow dredging of sediment layers that could be 20 feet thick; spud lengthening was accomplished in June.
- The river bypass system with a design rating of about 75 mgd could not keep up with river flows beginning in July 2003. This resulted in a delay in dredging the remaining cofferdam areas until river flow subsided to below the operational capacity of the bypass system.

Monitoring Data

References:

- **Sediment**
- **Water:**
- **Fish:**

POTENTIALLY RESPONSIBLE PARTIES

Project Name **GRAND CALUMET RIVER**

ProjectID: 05-07

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name **GRAND CALUMET RIVER**

ProjectID: 05-07

Last Name: KEY CONTACT INFORMATION NOT RELEASED

Contact ID:

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # :

Other Phone #:

Fax # :

Email Address:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A

ReferenceID: 78

Title: *Sediment Characterization Study - U.S. Steel, Gary, Indiana*

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: Floyd Browne Associates, Inc.; Division of GeoSciences

Preparer/Author

Address:

Prepared For: U.S. Steel (Division of USX Corporation)

Date Published: January 22, 1993

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 149

Title: *Baseline Human Health Risk Assessment : Grand Calumet River
/ Indiana Harbor Canal, Indiana, Area of Concern - ARCS (EPA
905-R94-025)*

Location: AEM

Category: Risk Assessment

Prepared by/Author: Judy L. Crane

Preparer/Author ASci Corporation

Address: Athens, GA 30613

Prepared For: Environmental Research Laboratory

Date Published: October 1994

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A

ReferenceID: 152

Title: *Information Summary, Area of Concern: Grand Calumet River, Indiana - Final Report*

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: J.W. Simmers, C.R. Lee, D.L. Brandon, H.E. Tatem and J.G. Skogerboe

Preparer/Author Address: U.S. Army Corps of Engineers
U. S. Army Engineer Waterways Experiment Station
Environmental Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Prepared For: US EPA, Great Lakes National Program Office, ARCS Program, Chicago, IL 60604.

Date Published: March 1991

Key Words and Phrases:

Reference Type: A

ReferenceID: 679

Title: *Technology Demonstration Summary - Resources Conservation Company's Basic Extractive Sludge Treatment (B.E.S.T.); EPA/540/SR-92/079*

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author: US EPA

Preparer/Author Address: Center for Environmental Research Information
Cincinnati, OH 45268

Prepared For: Distribution

Date Published: July 1993

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A

ReferenceID: 919

Title: *Designation of Corrective Action Management Unit and Response to Comments*

Location: AEM

Category: Contaminated Sediments: Disposal Methods

Prepared by/Author: USX Corporation - Gary Works

Preparer/Author Address: Gary, Indiana

Prepared For: US EPA Region V

Date Published: February 1999

Key Words and Phrases:

Reference Type: A

ReferenceID: 920

Title: *Corrective Action Order Issued Pursuant to Section 3008 (H) of RCRA (Attachment I to Reference A-919)*

Location: AEM

Category: Legal

Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works

Preparer/Author Address: Gary, Indiana

Prepared For: US EPA Region V

Date Published: October 1998

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A

ReferenceID: 921

Title: *Statement of Work - Grand Calumet River Sediment
Remediation Plan
(Attachment I to Reference A-920)*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works

**Preparer/Author
Address:** Gary, Indiana

Prepared For: US EPA Region V

Date Published: October 1998

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 922

Title: *Scope of Work - Facility Hydrogeologic Assessment and Current
Conditions Report and RCRA Facility Investigation
(Attachment II to Reference A-920)*

Location: AEM

Category: Contaminated Sediments: Disposal Methods

Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works

**Preparer/Author
Address:** Gary, Indiana

Prepared For: US EPA Region V

Date Published: October 1998

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A
Title: *Scope of Work - Interim Stabilization Measures
(Attachment III to Reference A-920)*
Location: AEM
Category: Miscellaneous
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: October 1998
Key Words and Phrases:

ReferenceID: 923

Reference Type: A
Title: *Scope of Work - Corrective Measures Study
(Attachment IV to Reference A-920)*
Location: AEM
Category: Contaminated Sediments: Remedial Options/Guidance
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: October 1998
Key Words and Phrases:

ReferenceID: 924

Reference Type: A
Title: *Scope of Work - Corrective Measures Implementation
(Attachment V to Reference A-920)*
Location: AEM
Category: Contaminated Sediments: Remedial Options/Guidance
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: October 1998
Key Words and Phrases:

ReferenceID: 925

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A
Title: ***Model Quality Assurance Project Plan
(Attachment VI to Reference A-920)***
Location: AEM
Category: Analytical Protocol/Issues/QAPP
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: October 1998
Key Words and Phrases:

ReferenceID: 926

Reference Type: A
Title: ***Guidance Documents
(Attachment VII to Reference A-920)***
Location: AEM
Category: Miscellaneous
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: October 1998
Key Words and Phrases:

ReferenceID: 927

Reference Type: A
Title: ***Statement of Basis - Designation of Corrective Action
Management Unit
(Attachment II to Reference A-919)***
Location: AEM
Category: Contaminated Sediments: Disposal Methods
Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works
Preparer/Author Address: Gary, Indiana
Prepared For: US EPA Region V
Date Published: April 1997
Key Words and Phrases:

ReferenceID: 928

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: A

ReferenceID: 929

Title: *Administrative Record Index - Designation of Corrective Action Management Unit (Attachment III to Reference A-919)*

Location: AEM

Category: Miscellaneous

Prepared by/Author: U.S. Steel (USX Corporation) - Gary Works

Preparer/Author Address: Gary, Indiana

Prepared For: US EPA Region V

Date Published: October 1998

Key Words and Phrases:

Reference Type: A

ReferenceID: 930

Title: *Consent Decree - United States of America (Plaintiff) v. USX Corporation (Defendant)*

Location: AEM

Category: Legal

Prepared by/Author:

Preparer/Author Address:

Prepared For: United States District Court for the Northern District of Indiana

Date Published: August 6, 1998

Key Words and Phrases:

Reference Type: A

ReferenceID: 1029

Title: *Section 401 Water Quality Certification*

Location: AEM

Category: Monitoring, Remediation (Pre- and during)

Prepared by/Author: Indiana Department of Environmental Management

Preparer/Author Address: 100 North Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

Prepared For: U.S. Steel

Date Published: October 20, 1998

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: B

ReferenceID: 132

Title: *TOC for Baseline Human Health Risk Assessment: Grand Calumet River / Indiana Harbor Canal, Indiana, Area of Concern*

Location: AEM

Category: Site Update

Prepared by/Author: (1) Judy L. Crane and (2) Robert B. Ambrose, Jr. (Project Officer) (3) US EPA ERL-Athens

Preparer/Author Address: (1) AScI Corporation
Athens, GA 30605 and
(2) US EPA ERL-Athens
Environmental Research Laboratory,
Athens, GA 30613
(3) US EPA ERL-Athens
Office of Research and Development
Environmental Research Laboratory
Athens, GA 30613

Prepared For: ARCS Program

Date Published:

Key Words and Phrases:

Reference Type: B

ReferenceID: 133

Title: *Grand Calumet River Indiana Harbor Ship Canal*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: RAP Progress Report

Date Published: November 1, 1996

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: B
Title: *Steelmaker to Clean Grand Calumet R. in IN*
Location: AEM
Category: Site Update
Prepared by/Author: US EPA Region V
Preparer/Author Address:
Prepared For: General Public
Date Published: August 10, 1998
Key Words and Phrases:

ReferenceID: 438

Reference Type: B
Title: *EPA Approves USX Sediment Disposal Facility*
Location: AEM
Category: Site Update
Prepared by/Author: US EPA Region V
Preparer/Author Address:
Prepared For: General Public
Date Published: May 2, 2000
Key Words and Phrases:

ReferenceID: 439

Reference Type: B
Title: *Realizing Remediation I - Great Lakes Contaminated Sediments Grand Calumet River/Indiana Harbor (see Reference A-905)*
Location: AEM
Category: Dredging: Remedial (Contaminated Sediments)
Prepared by/Author: US EPA Great Lakes National Program Office (GLNPO)
Preparer/Author Address: 77 West Jackson Boulevard (G-17J)
Chicago, IL 60604
Prepared For: General Public
Date Published: August 1, 2002
Key Words and Phrases:

ReferenceID: 783

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: B
Title: *Spotlight On: Grand Calumet River*
Location: AEM
Category: Site Update
Prepared by/Author: Susan Pastor
Preparer/Author Address: US EPA Region V
Prepared For: Fox River Current
Date Published: July/August 2002
Key Words and Phrases:

ReferenceID: 860

Reference Type: B
Title: *Memo re: Grand Calumet River Sediment Remediation Project Advances to Full Scale Operation*
Location: AEM
Category: Site Update
Prepared by/Author: US EPA Region V
Preparer/Author Address:
Prepared For:
Date Published: March 21, 2003
Key Words and Phrases:

ReferenceID: 925

Reference Type: B
Title: *Newsletter: Grand Calumet River Sediment Remediation Project*
Location: AEM
Category: Site Update
Prepared by/Author: U.S. Steel
Preparer/Author Address:
Prepared For: General Public
Date Published: May 2003
Key Words and Phrases:

ReferenceID: 1011

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: B
Title: *e-mail re: GRC Air Monitoring*
Location: AEM
Category: Monitoring, Remediation (Pre- and during)
Prepared by/Author: U.S. Steel
Preparer/Author Address:
Prepared For: AEM, Inc.
Date Published: October 29, 2003
Key Words and Phrases: air monitoring

ReferenceID: 1012

Reference Type: B
Title: *e-mail re: Grand Calumet Dredging*
Location: AEM
Category: Dredging: Equipment
Prepared by/Author: U.S. Steel
Preparer/Author Address:
Prepared For: AEM, Inc.
Date Published: December 26, 2003
Key Words and Phrases: double-wall piping

ReferenceID: 1013

Reference Type: B
Title: *e-mail re: Verification Sampling at GCR*
Location: AEM
Category: Cleanup Levels and Risks
Prepared by/Author: Earth Tech
Preparer/Author Address:
Prepared For: AEM, Inc.
Date Published: September 26, 2003
Key Words and Phrases:

ReferenceID: 1014

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: B
Title: *e-mail re: Grand Calumet River Final Report*
Location: AEM
Category: Site Update
Prepared by/Author: U.S. Steel
Preparer/Author Address:
Prepared For: AEM, Inc.
Date Published: June 7, 2004
Key Words and Phrases: dredge production rates

ReferenceID: 1133

Reference Type: C
Title: *Grand Calumet Sediments Study Completed*
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: Hazardous Waste Report
Date Published: March 8, 1993
Key Words and Phrases:

ReferenceID: 49

Reference Type: C
Title: *USX to remove Grand Calumet sediments*
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: Superfund Week
Date Published: February 19, 1993
Key Words and Phrases:

ReferenceID: 50

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: C

ReferenceID: 51

Title: *Steel mills to clean up Grand Calumet toxics*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Engineering News-Record (ENR)

Date Published: April 5, 1993

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 52

Title: *USS Gary Works pact reached*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Superfund Week

Date Published: October 22, 1993

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 323

Title: *USX Settles Pollution Charges*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Engineering News-Record (ENR)

Date Published: August 17, 1998

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: C

ReferenceID: 581

Title: *Sediment Remediation Can Improve Great Lakes Water Quality*

Location: AEM

Category: Miscellaneous

Prepared by/Author: (1) John H. Hartig, (2) Lisa Maynard, (3) Michael A. Zarull, (4) Gail Krantzberg

Preparer/Author (1) Greater Detroit American Heritage River Institute

Address: Detroit, MI
(2) International Joint Commission
Windsor, Ontario, Canada
(3) National Water Research Institute
Burlington, Ontario, Canada
(4) Ontario Ministry of Environment

Prepared For: Water Environment & Technology (WE&T)

Date Published: October 1999

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 960

Title: *In Brief: Grand Calumet*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: World Dredging Mining & Construction

Date Published: July 2002

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 1000

Title: *Grand Calumet Underway*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Dredging and Port Construction (DPC)

Date Published: September 2002

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: C

ReferenceID: 1125

Title: *Grand Calumet dredging project started*

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Dredging News Online

Date Published: July 26, 2002

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 242

Title: *Rally addresses dredging -- Northwest Indiana Residents for
Clean Air plans East Chicago rally protesting dredging project*

Location: AEM

Category: Site Update

Prepared by/Author: Jason Thomas

Preparer/Author

Address:

Prepared For: The Times Online (Northwest Indiana)

Date Published: November 2, 2001

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 452

Title: *River dredging under way*

Location: AEM

Category: Site Update

Prepared by/Author: Meggen Lindsay

Preparer/Author

Address:

Prepared For: Northwest Indiana News

Date Published: December 6, 2002

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: E

ReferenceID: 20

Title: *Carcinogenic Human Health Risks Associated with Consuming Contaminated Fish from Five Great Lakes Areas of Concern*

Location: AEM

Category: Risk Assessment

Prepared by/Author: Judy L. Crane

Preparer/Author Address: EVS Consultants
195 Pemberton Avenue
North Vancouver, British Columbia, V7P 2R4

Prepared For: Journal of Great Lakes Research 22 (3): 653-668 (Reference F-7)

Date Published: 1996

Key Words and Phrases:

Reference Type: E

ReferenceID: 27

Title: *Grand Calumet River (GCR) Sediment Remediation Plan*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Rick Menozzi

Preparer/Author Address:

Prepared For: Sediment Management Seminar (New Orleans)

Date Published: February 9 - 10, 1998

Key Words and Phrases:

Reference Type: E

ReferenceID: 138

Title: *Sediment Management Seminar February 9-10, 1998 Proceedings (Reference E-137)*

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Blasland, Bouck & Lee, Inc.

Preparer/Author Address: 6723 Towpath Road
P.O. Box 66
Syracuse, NY 13214

Prepared For: Attendees

Date Published: February 9-10, 1998

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: E

ReferenceID: 250

Title: ***Grand Calumet River Sediment Remediation Project: Largest Impacted Sediment, Hydraulically Dredged Project in North America***

Location: AEM

Category: Site Update

Prepared by/Author: (1) R. Menozzi, (2) G. Green, (3) T. Binsfield, (4) V. Buhr, (5) S. McGee, (6) C. Moses, (7) S. LaViolette, (8) T. Blackmar

Preparer/Author Address:

Prepared For: WEDA XXIII Conference, Chicago, IL

Date Published: June 10-13, 2003

Key Words and Phrases:

Reference Type: J

ReferenceID: 31

Title: ***Grand Calumet River Remediation Project***

Location: AEM

Category: Site Update

Prepared by/Author: US Steel

Preparer/Author Address: http://www.ussteel.com/corp/facilities/gary/rcra/grand_calumet_river_remediation_index.htm

Prepared For: General Public

Date Published: July 2, 2002 (Last Updated)

Key Words and Phrases:

Reference Type: J

ReferenceID: 35

Title: ***401 Water Quality Monitoring***

Location: AEM

Category: Monitoring, Remediation (Pre- and during)

Prepared by/Author: U.S. Steel

Preparer/Author Address: http://www.ussteel.com/corp/rcra/GCR_401_monitoring.htm

Prepared For: General Public

Date Published: March 7, 2003

Key Words and Phrases: water quality monitoring

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: J

ReferenceID: 36

Title: *Air Monitoring Report*

Location: AEM

Category: Monitoring Plan/Report

Prepared by/Author: U.S. Steel

Preparer/Author Address: <http://www.ussteel.com/corp/rcra/Air%20Monitoring%20Reports.htm>

Prepared For: General Public

Date Published: March 7, 2003

Key Words and Phrases: air monitoring

Reference Type: L

ReferenceID: 14

Title: *Memo re: Grand Calumet River*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address: Malvern, PA 19355

Prepared For: Internal file

Date Published: September 26, 1997

Key Words and Phrases:

Reference Type: L

ReferenceID: 43

Title: *Memo re: Grand Calumet River Remediation (USX Corporation)*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

Preparer/Author Address: Malvern, PA 19355

Prepared For: Distribution

Date Published: March 30, 1993

Key Words and Phrases:

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: L

ReferenceID: 218

Title: *Reconnaissance of Grand Calumet River Dredging Project on June 13, 2003*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:**

Prepared For: File

Date Published: July 22, 2003

**Key Words and
Phrases:**

Reference Type: M

ReferenceID: 152

Title: *Bench-Scale Evaluation of Zimpro's Wet Air Oxidation Process on Contaminated Sediments from the Grand Calumet River*

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author: Vic Engleman

**Preparer/Author
Address:** Science Applications International Corporation
San Diego, CA

Prepared For: US EPA
Great Lakes National Program Office
Assessment and Remediation of Contaminated Sediments (ARCS) Program
Chicago, IL 60604,

Date Published: May 1994

**Key Words and
Phrases:**

REFERENCES

Project Name GRAND CALUMET RIVER

ProjectID: 05-07

Reference Type: M

ReferenceID: 154

Title: *ARCS Bench-Scale Evaluation of SoilTech's Anaerobic Thermal Process Technology on Contaminated Sediments from the Buffalo and Grand Calumet Rivers*

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author: Michael Giordano and Evelyn Meagher-Hartzell

Preparer/Author Address: Science Applications International Corporation
Cincinnati, OH

Prepared For: US EPA
Great Lakes National Program Office
Assessment and Remediation of Contaminated Sediments (ARCS) Program
Chicago, IL 60604,

Date Published: 1994

Key Words and Phrases:

Reference Type: M

ReferenceID: 157

Title: *ARCS Bench-Scale Evaluation of RCC's Basic Extraction Sludge Treatment (B.E.S.T.) Process on Contaminated Sediments from the Buffalo, Saginaw, and Grand Calumet Rivers*

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author: Clyde J. Dial

Preparer/Author Address: Science Applications International Corporation
Cincinnati, OH

Prepared For: US EPA
Great Lakes National Program Office
Assessment and Remediation of Contaminated Sediments (ARCS) Program
Chicago, IL 60604,

Date Published: October 1994

Key Words and Phrases:

REFERENCES

Project Name **GRAND CALUMET RIVER**

ProjectID: 05-07

Reference Type: M

ReferenceID: 219

Title: ***Grand Calumet River/Indiana Harbor Canal, Indiana***

Location: AEM

Category: Site Update

Prepared by/Author: Beth A. Millemann

Preparer/Author

Address:

Prepared For: Muddy Waters - The Toxic Wasteland Below America's Oceans, Coasts,
Rivers and Lakes (Reference M-220)

Date Published: August 1999

***Key Words and
Phrases:***

FISH ADVISORIES

Project Name **GRAND CALUMET RIVER**

ProjectID: 05-07

Advisory: Grand Calumet River

AdvisoryID: 223

Extent: Including Indiana Harbor Ship Canal (Lake County)

Pollutant: PCBs (total)

Species: all fish

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: River

Advisory Number: 143

Status (Active or Rescinded): Active

Date Rescinded:

Contact Name: LaNetta Alexander

Contact Number: 317-233-7162

Advisory: Grand Calumet River

AdvisoryID: 517

Extent: Including Indiana Harbor Ship Canal (Lake County)

Pollutant: mercury

Species: all fish

Population: NCGP

Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: River

Advisory Number: 143

Status (Active or Rescinded): Active

Date Rescinded:

Contact Name: LaNetta Alexander

Contact Number: 317-233-7162
