

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	<u>WHITE LAKE - PROJECT 2 (Rest of Lake)</u>	ProjectID: 05-39
Last Updated:	01/14/04	
City:	Montague	
County:	Muskegon	
State:	MI	
Country:	USA	
Bodies of Water:	White Lake	
US EPA Region:	V	
Status (Active, Complete, or Monitoring Only):	Complete	
Date On NPL:	N/A	
ROD/ESD Date:	N/A	
Operable Unit:	N/A	
Areas of Concern (length or acres):	A 1.6-acre area of sediment located along the northern shore of White Lake about 400 yards offshore of the Occidental Chemical Corporation (formerly Hooker Chemical Company) property.	
Other Characteristics of Water Body:	White Lake is a 2,570-acre drowned river mouth located along the eastern shore of Lake Michigan. The lake is a Great Lakes AOC that includes the lake proper and a 0.25 mile zone around the lake.	
Contaminants of Concern:	PCBs; hexachlorobenzene; heavy metals (arsenic, cadmium, chromium, lead, manganese, mercury, nickel, and zinc); oil and grease; chloroform; mirex	
Source of Contamination:	Nearby sediment became contaminated through historic discharges from a single outfall pipe originating from the now defunct Occidental Chemical Corporation (OCC) (formerly Hooker Chemical Company) facility, originally located about one-quarter mile north of the lake shoreline. White Lake was listed as a Great Lakes AOC as a result of the leaching of organic solvent-contaminated groundwater from the OCC site. Additionally, direct industrial discharges, discharges from CSOs, and discharges of surface water runoff have all been identified as potential sources of contamination to the lake. Eight other potential sources of contamination to the lake have been identified, including the now defunct Whitehall Leather Co. site that historically discharged to Tannery Bay (Project ID 05-38).	
Contaminated Area Physical Characteristics:	Contaminated sediment near the Occidental Chemical Corporation site covers one to two acres, is about two feet thick, and is located in 45 to 50 feet of water. Sediment samples in the vicinity of the OCC outfall were collected on six different occasions beginning in October 1997 and ending August 2001. Hexachlorobenzene (HCB) surface (0 to 0.5 ft) sediment concentrations above 0.45 ppm were found to extend about 400 feet southeast into the lake from the outfall. PCB concentrations above 2 ppm in surface sediments covered a similar area. The highest HCB and PCB concentrations, 110 ppm and 390 ppm, respectively, were found in the 0 to 0.5 ft interval. The highest concentrations for both contaminants were typically found in the 0 to 0.5 ft and 1 to 1.5 ft depth intervals.	
Type of Regulatory Action:	RCRA. EPA-Lead.	
Overall Status Summary:	White Lake is a Great Lakes Area of Concern (AOC) that encompasses a 2,570 acre area of coastal, drowned river mouth along the east shore of Lake Michigan. The AOC includes the lake and a one-quarter mile zone around the lake. Originally listed as an AOC due to contaminated groundwater infiltration from the now defunct Hooker Chemical Company site (now Occidental Chemical Corporation [OCC]), sediment in the vicinity of the site's abandoned outfall pipe was found to contain elevated levels of hexachlorobenzene and PCBs. There are also eight other sites identified as potential sources of contamination to the lake. One of these	

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is 10-acre Tannery Bay located at the east end of the lake (Project ID 05-38).

The lake is contaminated with PCBs, hexachlorobenzene, chlordane, mercury, chromium, and lead as well as other heavy metals. Chromium and lead are the most elevated contaminants in a majority of White Lake sediments. Consumption advisories are in place due to elevated levels in fish of PCBs, chlordane, and mercury. Water column samples collected in 1992 from the navigational channel connecting White Lake to Lake Michigan indicated that nearly all of the parameters of concern were below levels found in 1987 and that all were below Michigan's water quality standards.

In July 2001, USEPA issued a final decision document for the OCC site that selected dredging as the preferred remedy for sediment impacted by the site. In the document, USEPA requires that sediment containing 2 ppm or greater PCBs or 0.45 ppm or greater hexachlorobenzene be removed by dredging. Prior to this, OCC had recommended the use of in-situ bioremediation for the remediation of sediment using pellets of a proprietary formula marketed as BioGeoChemMix. USEPA rejected the recommendation based on strong community objection and because the method remained unproven.

During Summer 2001, OCC collected additional sediment samples to further characterize the impacted sediments and in Fall 2001 sent to USEPA a plan for the removal of approximately 12,500 cy of sediment from below the site outfall pipe. The remedial action reportedly would result in the removal of 1,100 pounds of contaminants from White Lake. Final design of the dredging project was sent to USEPA in April 2002 and USEPA provided its approval based on proposed modifications in a letter dated May 13, 2002. The final design document reduced the targeted removal volume from 12,500 cy to 8,500 cy, from 1.6 acres of lake bottom.

Dredging was originally targeted to begin in September 2002 and Bean Environmental LLC was selected to perform the dredging. The dredging system to be employed was to consist of a Teflon-lined 4.6 cy horizontal profile grab bucket attached to a hydraulic excavator and slurry processing unit. During Fall 2002, USEPA reevaluated this selected method and the result was rebidding of the project in early 2003 and selection of Faust Construction to perform the dredging using Cable Arm environmental buckets. The design required removed sediment to be loaded onto barges for transport to OCC property where it would be slurried for transport to another area of the OCC site for subsequent dewatering using Geotubes. Following dewatering, the sediment would be disposed in either a TSCA-approved landfill for sediment with in-situ PCB concentrations greater than or equal to 50 ppm or a solid waste landfill, for in-situ PCB concentrations of less than 50 ppm.

The project was performed under USEPA oversight within the RCRA program. Site preparation began in June 2003; dredging began on or about July 28, 2003 and was completed by the end of September 2003. Final removal volume was 10,500 cy.

Remedial Action Planned: ☒

Risk Assessment: ☐

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

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<i>Last Updated:</i>	01/14/04	
<i>References:</i>	<input checked="" type="checkbox"/>	
<i>Modeling:</i>	<input type="checkbox"/>	
<i>Fishing Advisory:</i>	<input checked="" type="checkbox"/>	
<i>Key Conditions:</i>	commercial landfill, dredging, Great Lakes AOC, natural recovery, specialty dredge	

REMEDIAL ACTION PLANNED

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Target Sediment Cleanup Standards (TSCS):	<2 ppm PCBs and <0.45 ppm hexachlorobenzene	
How TSCS Established:		
Target Bank and Floodplain Cleanup Levels (if applicable):	N/A	
Other Target:	N/A	
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment:• Water:• Fish:	
Estimated Target Volume:	8,500 cy (of which 2,088 cy is anticipated to contain >50 ppm PCBs)	
Planned Disposal Method:	Onsite dewatering using Geotubes and offsite disposal at either a TSCA-approved landfill for sediment containing 50 ppm or greater PCBs or a local solid waste landfill for sediment containing less than 50 ppm PCBs.	
Estimated Calendar Time to Implement Remedy:	To start in September 2002.	
Estimated Time to Implement Remedy:		
Estimated Cost to Implement Remedy:		
Stated Remedial Action Objectives (and Source):	(Source: Reference A-839): "The objective of this dredging project is to safely dredge the area in White Lake described in the letter from Glenn Springs Holdings to U.S. EPA entitled "White Lake Sediment Report and Dredging Area" and dated November 2, 2001. This will eliminate environmental exposure to sediments containing over 2 mg/kg PCBs or over 0.45 mg/kg hexachlorobenzene."	
Measures of Success to be Used:	Verification samples will be collected to document that remaining surface sediments in the target area contain less than 2 ppm PCBs and less than 0.45 ppm hexachlorobenzene.	
Planned Monitoring and Restoration:	Both short-term (during sediment removal) and long-term (to include direct measurement of fish and biota measurement endpoints) monitoring are required to be implemented. Monitoring during dredging requires turbidity readings to be collected at two upstream locations 800 ft. north of the dredge site and at eight locations surrounding the dredge site at 300 ft. from the dredge site perimeter. Half of the locations will be located at 10 ft. below the water surface and half will be located at 10 ft. above the sediment surface.	
Agency Position on Sediment Removal (and Source):	Source: July 2001 Decision Document, Reference A-726: "The response action documented in this Final Decision is necessary to protect human health and environment." Additionally:	

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“Bioremediation has been eliminated as a reliable remedial alternative for contaminated soil and sediment, and dredging is the selected remedial alternative for contaminated sediment in White Lake.”

REMEDIAL ACTION IMPLEMENTED

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Physical Target:	About 8,500 to 9,400 cy of contaminated sediment from a 1.6-acre area of White Lake.	
Goals:	To remove all sediment containing greater than 2 ppm PCBs and 0.45 ppm hexachlorobenzene.	
Primary Contractor:	Faust Construction (dredge contractor)	
Other Contractors:	Earth Tech (water treatment and oversight engineer); Cable Arm, Inc. (dredge system contractor)	
Generic Remediation Method:	Mechanical dredging	
Equipment:	Derrick barge with mounted 80-ton crane and 40 ft. by 40 ft. dredge cell; 4.5 cy Cable Arm environmental bucket; two 400 cy material scows; small tug; excavator equipped with a 3 cy clamshell bucket; large hopper equipped with a screen with 6-inch openings; three-axle 28 to 30 cy capacity dump trucks; transfer facility for pumping to the dewatering operations; geotubes; water treatment system (sand filter; 25 µm bag filter; two carbon filters)	
Material Handling:	<ul style="list-style-type: none">• A 4.5 cy Cable Arm environmental bucket attached to an 80-ton crane on a derrick barge was used for dredging. Dredging took place within a 40-foot by 40-foot dredge cell located on the dredge end of the derrick barge and created using an I-beam and two modu-barges lashed to the dredge end of the derrick barge. A silt curtain that extended four feet into the water column was attached to the four sides of the dredge cell. Reportedly, the dredge cell was used to assist in dredge positioning and may confine some surface turbidity that is created when the bucket was raised from the water.• The dredged sediment consisted primarily of soft silt with little debris. Dredge cycle times averaged about three minutes. Removal over the project duration averaged 335 cy per day (4 ½ weeks to remove about 9,000 cy).• A dip tank was used to rinse the bucket during each cycle to assist in controlling turbidity generation. The tank was supported using a third modu-barge adjacent to the dredge cell and on the side of the derrick barge opposite from the material scow.• The procedure outlined for dredging required sediment be removed in one-foot lifts and placed into one of two 400 cy scows for transport to the unloading operations. The use of one-foot lifts was designated as a means to control the removal of various overlying layers of TSCA and non-TSCA sediments. Following the removal of TSCA materials, sediment was removed in both one- and two-foot lifts to reach final design elevations.• Dredge availability was one ten-hour shift per day, six days per week. Dredge operation was constrained due to the inability of the land-based unloading operations to keep pace with dredging. A single tug, approximately 20 to 25 feet in length, was used to transport the material barges to and from the offloading facility and to assist movement of the derrick barge.• A five-point anchor mooring system attached to the barge cable and winch system was used to move and maintain position of the derrick barge. A steel cable was extended through each corner of the barge for attachment to one of five anchor mooring points located outside the dredge area. To allow other vessels near the derrick barge without interfering with the anchoring system, “down riggers” were attached to the bottom of the barge. One cable had two mooring locations, one located on either side of the existing OCC facility discharge pipe. The cable anchor point was switched between the locations as needed to eliminate interference between the cable and outfall pipe, depending on the position of the barge with respect to the discharge pipe.	

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	<ul style="list-style-type: none">• Dredging was controlled, monitored, and recorded using the latest Cable Arm ClamVision system. The system provided real-time operator interface for controlling bucket XYZ positioning and provided visual confirmation of bucket closure and removal depth vs. target depth for each bucket of sediment removed. The Cable Arm contractor also performed pre-dredge sidescan sonar to develop initial bottom contours for input to the ClamVision system. Periodic sidescan sonar measurements were performed to verify post-dredge bottom elevations that were used to calculate sediment removal volumes, and also to calibrate the Clamvision system.• Material scows were transported from the derrick barge to the land-based facility using a small tugboat, a distance of between 300 and 500 yards.• A large derrick barge was moored to a temporary bulkhead for use as a work platform for performing offloading operations. Offloading equipment consisted of an excavator equipped with a 3 cy clamshell bucket and a large hopper equipped with a screen with 6-inch openings for the removal of oversized material. The excavator removed dredged material from a filled scow and placed the material into the hopper. The screened material then discharged into a waiting three-axle 28 to 30 cy capacity dump truck. The trucks were filled to one-third to one-half capacity. The top of the hopper was hinged so that oversized material that collected on the hopper screen could be dumped into a separate container for subsequent disposal.• The trucks transported the material about one-quarter mile to a transfer facility for pumping to the dewatering operations. The sediment was dumped into a below-ground holding tank where water jets slurried the sediment to allow for pumping to Geotubes for dewatering. Each truck required about five minutes to unload. The back and top of each truck were modified by addition of metal plates to control and contain the sediment during transport and discharge.• A cationic polymer was added to the transfer facility pump discharge line to promote dewatering. The sediment slurry was pumped at about 1,000 gpm over about 300 yards to the dewatering area. The transfer station operated only intermittently as loaded trucks became available.• The slurried sediment was discharged directly into Geotubes, one Geotube at a time, for dewatering. The project design required the use of ten Geotubes, each one 45 feet in circumference x 200 feet long and capable of holding 900 cy of dewatered sediment. Two of the Geotubes were dedicated for TSCA material. The design volume reduction for dewatered sediment was 40%. The Geotubes were refilled periodically as they continued to dewater. Considerable algae growth occurred on the Geotubes following filling, likely reducing the ability of water to drain from the Geotubes.• The Geotubes were laid side-by-side in a bermed holding area constructed of sand graded to a one percent slope and covered by 40 ml geocomposite. Water draining from the Geotubes flowed to a small holding pond for removal and treatment.	
Volume Removed:	10,500 cy	
Calendar Time:	Site preparation began in early June 2003; dredging began on or about July 28, 2003 and ended August 28, 2003; all in-water work ended September 8, 2003.	
Time To Implement:	4 ½ weeks (375 cy per day avg., assuming 6 day per week operation and 10,500 cy removed)	
Total Cost:	\$5 million (\$476 per cy)	
Dredging Cost:		

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Disposal of Sediment: Consolidation of sediment in the Geotube took about 20 days, which was determined by measuring the height of the Geotube. Disposal of sediment was performed from late-Oct to late-Nov 2003, a period of about 30 days total including mob/demob. Sediment was trucked to two separate landfills. TSCA-designated material was sent to the EQ Landfill near Detroit and the non-TSCA-designated material was sent to a local municipal landfill. Material was transported by truck. A stabilizing agent was made available but was not needed; the sediment was sufficiently dewatered for transport and disposal directly from the Geotubes.

Volume of Water: Pending confirmation.

Method of Water Treatment: Water from the Geotubes that collected in the holding pond was treated using, in sequence of operation, a sand filter, 25 µm bag filter, and two carbon filters. Discharge was back to White Lake under a project NPDES permit.
Note: The 25 µm bag filter replaced a 5 µm bag filter called for in the original design. The bag filter pore size was increased due to continual plugging problems. Subsequently, the carbon filters became plugged with solids and the water treatment system was shutdown, resulting in the need to increase the capacity of the holding pond to accommodate the additional water storage requirements. A 3 µm bag filter was also added to the system in front of the carbon filters.

Water Discharge Limit: Non-detect for PCBs, reportedly continuously met.

Air Monitoring During Remediation:

Water Monitoring During Remediation:

- Perimeter turbidity barriers were not used at the site. The only turbidity barrier used was the dredge cell perimeter silt curtain that extended to four feet below the water surface. It is unclear if the silt curtain was effective in mitigating the migration of resuspended material from the dredge cell.
- During initial project design, USEPA set the turbidity limit at two times background. Follow-up turbidity monitoring by the OCC design contractor showed that background varied from 2 to 10 NTU. OCC argued that when background turbidity levels are very low, then the limit for dredging would also be very low. USEPA agreed to a limit of 20 NTU, twice the maximum measured background level of 10 NTU.
- Five automated monitoring stations were used to monitor turbidity, four located downstream or side-stream and one located upstream of the dredge area, for background. Each station consisted of two turbidity meters, one at 10 feet below the water surface and one at 10 feet above the sediment surface. Each was located about 300 feet from the dredge area perimeter. The cost of the turbidity monitoring system was about \$80,000.
- Each monitoring station was programmed to collect turbidity measurements every 10 minutes. The measurements were downloaded every hour via wireless transmission to a central computer. Six readings in a row (one hour of data) exceeding 20 NTU from any one station would require that dredging cease.
- Additionally, turbidity was measured daily at each monitor at both depths using hand-held equipment to correlate with the automated readings and to verify the accuracy of the automated data. Turbidity measurements were also collected periodically from near the dredge head (typically from around the derrick barge) using hand-held equipment. Reportedly, on August 7, turbidity near the dredge head measured about 6.5 NTU.
- Lake flow was also monitored periodically and averaged about 4 feet per day westward toward Lake Michigan.

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- The automated turbidity meters were cleaned about every other day, the exact frequency being determined by monitoring the trend in turbidity readings from each meter and by comparing those readings to the turbidity readings collected using hand-held meters.

Outcome:

A depth target was selected based on removing all sediment with greater than 2 ppm PCBs and 0.45 ppm HCB. The removal contractor was to remove to the target depth, at a minimum. No "overdredge allowance" was specified as part of the project design.

Verification sampling was performed for both PCBs and HCB following the removal of sediment to the design elevation. The target concentrations were 2 ppm PCBs and 0.45 ppm HCB.

Dredging to design elevations was completed on August 28, 2003. Initial verification samples were collected for two days following the completion of production dredging. The dredge area was divided into 32 dredge cells of equal size for the collection of verification samples. Following dredging to the target depth, a single surface sediment sample was collected using a Ponar sampler from the center of each dredge cell. The 32 individual samples were then combined into eight composite samples, each composite sample comprising four verification samples collected from adjoining dredge cells. The composite samples were then analyzed for PCBs and HCB; if any composite sample exceeded the target cleanup criteria of 2 ppm PCBs or 0.45 ppm HCB, the discrete samples would then be analyzed to determine which dredge cells exceeded the cleanup criteria.

Of the eight initial composite samples analyzed, all were below the HCB cleanup criterion and only one was below the PCB criterion. The 28 individual samples that made up the seven composite samples that exceeded the PCB cleanup criterion were then analyzed. The results indicated that 22 to 24 dredge cells exceeded the PCB cleanup criterion. Each of these dredge cells was dredged to remove an additional nine inches of sediment. Verification samples were collected from each dredge cell following dredging which resulted in two dredge cells exceeding the PCB cleanup criterion. A second dredge pass was then performed in these two cells to remove an additional 12 inches of sediment; follow-up verification sampling indicated that the PCB cleanup criterion was met.

All in-water work was completed by September 8, 2003. Sediment removal averaged 375 cy per day during the four and one-half weeks of dredging. The project unit cost is estimated at \$476 per cy, based on 10,500 cy removed at a cost of \$5 million.

Restoration and Post-Monitoring:

None required by the Final Decision (Reference A-726)

Site-Specific Difficulties:

(1) The offloading operations experienced numerous difficulties that limited dredge operation due to the unavailability of sufficient barge capacity for continued dredging. The major operational difficulties identified are:

- Inefficient offloading of the dredged material from the barge as a result of: 1) a greater volume of water being generated during the dredging process than originally anticipated or 2) the sediment containing a greater amount of fines than originally anticipated.

The Cable Arm bucket used is designed to remove sediment in two-foot lifts to obtain optimal sediment loading. Therefore, the removal of material in one-foot lifts, as required in the project design for a significant portion of the removal volume, resulted in about one half of each Cable Arm bucket volume being primarily water. Visual observation of a nearly fully loaded scow showed only water (i.e., no dredged material protruding above the overlying water), indicating a high water to sediment ratio within the scow. Additionally, the high content of fines within the removed

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sediment allowed the sediment to more readily combine, and remain combined, with the overlying water each time the excavator clamshell bucket was lowered into the sediment as part of offloading. These factors combined to make efficient offloading of dredged material difficult using the excavator and clamshell bucket. As a result, material offloading took longer than anticipated and, many times, the material barges were not completely unloaded before their return to the derrick barge. In an attempt to remedy this, a pumping system was installed to remove excess water from the scows prior to offloading of solids using the excavator.

The excavator was used for bulkhead installation and other project mobilization work. Although not ideally suited for the offloading of dredged material, the removal contractor decided to use it for this purpose in lieu of mobilizing another, and possibly better suited, piece of equipment.

- Removal of material from the scows was directly linked to the need for a truck to be positioned below the hopper. This required the excavator to halt operations once a truck was loaded until the next truck was in place. Additionally, because of the low viscosity of the offloaded material, the trucks could only be loaded to one-third to one-half capacity so that the material did not overtop the sides during transport. The inability to fully load the trucks resulted in the need to switch out trucks more often, further slowing offloading operations.

The use of trucks and a transfer facility was selected during project design in lieu of direct pumping of the sediment to the dewatering facility. Reasons for this were: 1) the topography near the lake shoreline rose steeply, about 50 feet, which would have required a relatively large pumping system and 2) it was anticipated that the sediment would contain a greater quantity of sand, requiring additional velocity to maintain the sand in suspension and with a greater risk of the pipe becoming clogged if the system shut down.

(2) The 25 µm bag filter replaced a 5 µm bag filter that was specified in the original design. The bag filter pore size was increased due to continual plugging problems. Reportedly, shortly following the change to the larger pore size filter (the 25 µm bag), the carbon filters began plugging with solids and the water treatment system eventually was shutdown. This in turn resulted in the need to increase the capacity of the holding pond to accommodate additional water storage requirements so that dredging was not disrupted. A 3 µm bag filter was eventually added to the system between the 25 µm bag filter and the carbon filters to minimize plugging of the carbon filters.

Monitoring Data

References:

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

POTENTIALLY RESPONSIBLE PARTIES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name **WHITE LAKE - PROJECT 2 (Rest of Lake)**

ProjectID: 05-39

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 WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: A

ReferenceID: 726

Title: *Final Decision and Response to Comments*

Location: AEM

Category: ROD/Proposed Plan/Action Memo/Decision Document

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: July 18, 2001

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 839

Title: *Final Dredging Design for Dredging White Lake Sediment Near
the Former Occidental Chemical Corporation Site*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Earth Tech, Inc.

**Preparer/Author
Address:** 5555 Glenwood Hills Parkway SE
Grand Rapids, MI 49588-0874

Prepared For: Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: April 2002

**Key Words and
Phrases:**

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: A

ReferenceID: 844

Title: *Results of the Investigation and Evaluation of White Lake Sediments During 2001*

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: Earth Tech, Inc.

Preparer/Author Address: 5555 Glenwood Hills Parkway SE
Grand Rapids, MI 49588-0874

Prepared For: Occidental Chemical Corporation
1795 Baseline Road
Grand Island, NY 14072-2010

Date Published: November 2001

Key Words and Phrases:

Reference Type: A

ReferenceID: 845

Title: *Final Dewatering Design for Dredging White Lake Sediment Near the Occidental Chemical Corporation Site*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Earth Tech, Inc.

Preparer/Author Address: 5555 Glenwood Hills Parkway SE
Grand Rapids, MI 49588-0874

Prepared For: Miller Springs Remediation Management, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: June 2002

Key Words and Phrases:

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: A

ReferenceID: 846

Title: *Program Management Plan for the Corrective Measure Implementation at the Occidental Chemical Corporation Site*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Earth Tech, Inc.

Preparer/Author Address: 5555 Glenwood Hills Parkway SE
Grand Rapids, MI 49588-0874

Prepared For: Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: November 2001

Key Words and Phrases:

Reference Type: B

ReferenceID: 626

Title: *AOC Updates - White Lake*

Location: AEM

Category: Site Update

Prepared by/Author: Tanya Cabala

Preparer/Author Address:

Prepared For: General Public

Date Published: 1996 Fall

Key Words and Phrases:

Reference Type: B

ReferenceID: 627

Title: *White Like Area of Concern*

Location: AEM

Category: Site Update

Prepared by/Author: Michigan Department of Natural Resources
(now the Michigan Department of Environmental Quality)

Preparer/Author Address:

Prepared For: General Public

Date Published: 1994-95 circa

Key Words and Phrases:

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: B

ReferenceID: 628

Title: *Remedial Action Plan - White Lake*

Location: AEM

Category: Site Update

Prepared by/Author: Michigan Department of Natural Resources
(now the Michigan Department of Environmental Quality)

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: 1996 circa

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 629

Title: *White Lake*

Location: AEM

Category: Site Update

Prepared by/Author: Tanya Cabala

**Preparer/Author
Address:**

Prepared For: Michigan Areas of Concern News

Date Published: 1997 Spring

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 630

Title: *White Lake Area of Concern*

Location: AEM

Category: Site Update

Prepared by/Author: US EPA

**Preparer/Author
Address:** Great Lakes National Program Office
Chicago, IL

Prepared For: General Public

Date Published: August 23, 1999

**Key Words and
Phrases:**

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: B

ReferenceID: 631

Title: *White Lake Contamination Sediment Outreach Project*

Location: AEM

Category: Miscellaneous

Prepared by/Author: US EPA GLNPO

Preparer/Author Address: 77 W. Jackson Blvd.
Chicago, IL

Prepared For: Distribution

Date Published: October 10, 2001

Key Words and Phrases:

Reference Type: B

ReferenceID: 632

Title: *Letter re: Approval with Modifications of White Lake Sediment Results and Dredging Area – Occidental Chemical Corporation MID 006 014 906*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Kenneth S. Bardo

Preparer/Author Address: US EPA Region V

Prepared For: Ken Price, Director Operations
Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: November 15, 2001

Key Words and Phrases:

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: B

ReferenceID: 726

Title: *Letter re: Occidental Chemical Corporation, Montague, Michigan - MID 006 014 906, White Lake Sediment Report and Dredging Area*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Ken Price, Director of Operations

Preparer/Author Address: Glenn Springs Holdings, Inc.
2490 Fortune Drive, Suite 300
Lexington, TX 40509

Prepared For: Ken Bardo, Project Coordinator
US EPA Region V
RCRA Enforcement Branch
77 West Jackson Boulevard (DE-9J)
Chicago, IL 60604

Date Published: November 2, 2001

Key Words and Phrases:

Reference Type: B

ReferenceID: 727

Title: *Letter re: Final Dredging Design, Occidental Chemical Corporation, MID 006 014 906 - May 2002*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Ken Bardo, Project Coordinator

Preparer/Author Address: Corrective Action Section
US EPA Region V
RCRA Enforcement Branch
77 West Jackson Boulevard (DE-9J)
Chicago, IL 60604

Prepared For: Ken Price
Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: May 13, 2002

Key Words and Phrases:

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: B

ReferenceID: 728

Title: *Letter re: Final Dredging Design, Occidental Chemical Corporation, MID 006 014 906 - July 2002*

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Ken Bardo, Project Coordinator

Preparer/Author Address: Corrective Action Section
US EPA Region V
RCRA Enforcement Branch
77 West Jackson Boulevard (DE-9J)
Chicago, IL 60604

Prepared For: Ken Price
Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

Date Published: July 11, 2002

Key Words and Phrases:

Reference Type: B

ReferenceID: 962

Title: *e-mail re: Status of White Lake (Tannery Bay)*

Location: AEM

Category: Site Update

Prepared by/Author: Roger Jones

Preparer/Author Address: MI DEQ
Surface Water Quality Division
Lansing, MI 48909

Prepared For: AEM, Inc.

Date Published: July 12, 2002

Key Words and Phrases:

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: C

ReferenceID: 1077

Title: *Precise Positioning Aids Earth Tech, Faust and Cable Arm in White Lake Dredging*

Location: AEM

Category: Site Update

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For: International Dredging Review (IDR)

Date Published: September/October 2003

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 1110

Title: *Draft - Precision, Low-turbidity Dredging of Contaminated Sediments*

Location: AEM

Category: Contaminated Sediments: Remedial Options/Guidance

Prepared by/Author: (1) John Downing, (2) Ray Bergeron, (3) James Tolbert

**Preparer/Author
Address:** (1) D & A Instrument Company
Port Townsend, WA

(2) Cable Arm, Inc.

Trenton, MI

(3) Earth Tech, Inc.

Grand Rapids, MI

Prepared For: Sea Technology Magazine

Date Published: March 2004 (pending)

**Key Words and
Phrases:**

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: D

ReferenceID: 158

Title: *Muskegon-area toxic mud threat to health of fish, people*

Location: AEM

Category: Site Update

Prepared by/Author: The Associated Press

**Preparer/Author
Address:**

Prepared For: The Kalamazoo (MI) Gazette

Date Published: November 4, 1998

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 342

Title: *EPA orders dredging of 'dead zone'*

Location: AEM

Category: Site Update

Prepared by/Author: Dave LeMieux

**Preparer/Author
Address:**

Prepared For: The Muskegon (MI) Chronicle

Date Published: July 26, 2001

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 495

Title: *Dredging Dowie (refers to Dowie Point)*

Location: AEM

Category: Site Update

Prepared by/Author: Debra Carte

**Preparer/Author
Address:**

Prepared For: The Whitehall (MI) White Lake Beacon

Date Published: August 24, 2003

**Key Words and
Phrases:**

REFERENCES

Project Name WHITE LAKE - PROJECT 2 (Rest of Lake)

ProjectID: 05-39

Reference Type: L

ReferenceID: 161

Title: *Memo re: Torch Lake, Deer Lake, White Lake*

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:** Malvern, PA 19355

Prepared For: Distribution

Date Published: June 22, 2001

**Key Words and
Phrases:**

Reference Type: L

ReferenceID: 227

Title: *Geotube Use Summary Table*

Location: AEM

Category: Dredging: Miscellaneous

Prepared by/Author: AEM, Inc.

**Preparer/Author
Address:**

Prepared For: Distribution

Date Published: February 3, 2004

**Key Words and
Phrases:**

FISH ADVISORIES

Project Name **WHITE LAKE - PROJECT 2 (Rest of Lake)**

ProjectID: 05-39

<i>Advisory:</i>	White Lake	<i>AdvisoryID:</i> 842
<i>Extent:</i>	Muskegon County	
<i>Pollutant:</i>	PCBs (total)	
<i>Species:</i>	carp-common	
<i>Population:</i>	NCSP	
<i>Population Definition:</i>	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.	
<i>Advisory Type:</i>	Lake	<i>Advisory Number:</i> 247
<i>Status (Active or Rescinded):</i>	Active	<i>Date Rescinded:</i>
<i>Contact Name:</i>	David R. Wade	<i>Contact Number:</i> 517-335-8834
<hr/>		
<i>Advisory:</i>	White Lake	<i>AdvisoryID:</i> 843
<i>Extent:</i>	Muskegon County	
<i>Pollutant:</i>	chlordane	
<i>Species:</i>	carp-common	
<i>Population:</i>	NCSP	
<i>Population Definition:</i>	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.	
<i>Advisory Type:</i>	Lake	<i>Advisory Number:</i> 247
<i>Status (Active or Rescinded):</i>	Active	<i>Date Rescinded:</i>
<i>Contact Name:</i>	David R. Wade	<i>Contact Number:</i> 517-335-8834
<hr/>		
<i>Advisory:</i>	White Lake	<i>AdvisoryID:</i> 844
<i>Extent:</i>	Muskegon County	
<i>Pollutant:</i>	PCBs (total)	
<i>Species:</i>	bass-smallmouth	
<i>Population:</i>	RSP	
<i>Population Definition:</i>	Restricted Consumption-Subpopulation(s): Advises subpopulations potentially at greater risk, e.g., pregnant or nursing women, and/or small children, to restrict the size of the organism and/or frequency of meals consumed.	
<i>Advisory Type:</i>	Lake	<i>Advisory Number:</i> 247
<i>Status (Active or Rescinded):</i>	Active	<i>Date Rescinded:</i>
<i>Contact Name:</i>	David R. Wade	<i>Contact Number:</i> 517-335-8834

FISH ADVISORIES

Project Name **WHITE LAKE - PROJECT 2 (Rest of Lake)**

ProjectID: 05-39

Advisory: White Lake ***AdvisoryID:*** 845
Extent: Muskegon County
Pollutant: PCBs (total)
Species: walleye
Population: RSP
Population Definition: Restricted Consumption-Subpopulation(s): Advises subpopulations potentially at greater risk, e.g., pregnant or nursing women, and/or small children, to restrict the size of the organism and/or frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 846
Extent: Muskegon County
Pollutant: PCBs (total)
Species: walleye
Population: RGP
Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 847
Extent: Muskegon County
Pollutant: mercury
Species: walleye
Population: RGP
Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

FISH ADVISORIES

Project Name **WHITE LAKE - PROJECT 2 (Rest of Lake)**

ProjectID: 05-39

Advisory: White Lake ***AdvisoryID:*** 848
Extent: Muskegon County
Pollutant: mercury
Species: walleye
Population: RSP
Population Definition: Restricted Consumption-Subpopulation(s): Advises subpopulations potentially at greater risk, e.g., pregnant or nursing women, and/or small children, to restrict the size of the organism and/or frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 849
Extent: Muskegon County
Pollutant: mercury
Species: bass-smallmouth
Population: RSP
Population Definition: Restricted Consumption-Subpopulation(s): Advises subpopulations potentially at greater risk, e.g., pregnant or nursing women, and/or small children, to restrict the size of the organism and/or frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 850
Extent: Muskegon County
Pollutant: mercury
Species: bass-smallmouth
Population: RGP
Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.
Advisory Type: Lake ***Advisory Number:*** 247
Status (Active or Rescinded): Active ***Date Rescinded:***
Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

FISH ADVISORIES

Project Name **WHITE LAKE - PROJECT 2 (Rest of Lake)**

ProjectID: 05-39

Advisory: White Lake ***AdvisoryID:*** 851
Extent: Muskegon County
Pollutant: PCBs (total)
Species: bass-smallmouth
Population: RGP
Population Definition: Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.

Advisory Type: Lake ***Advisory Number:*** 247

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 852
Extent: Muskegon County
Pollutant: PCBs (total)
Species: carp-common
Population: NCGP
Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Lake ***Advisory Number:*** 247

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: David R. Wade ***Contact Number:*** 517-335-8834

Advisory: White Lake ***AdvisoryID:*** 853
Extent: Muskegon County
Pollutant: chlordane
Species: carp-common
Population: NCGP
Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Lake ***Advisory Number:*** 247

Status (Active or Rescinded): Active ***Date Rescinded:***

Contact Name: David R. Wade ***Contact Number:*** 517-335-8834
