

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	<u>OUTBOARD MARINE</u>	ProjectID: 05-12
Last Updated:	06/27/02	
City:	Waukegan	
County:	McHenry	
State:	IL	
Country:	USA	
Bodies of Water:	Waukegan Harbor; Lake Michigan	
US EPA Region:	V	
Status (Active, Complete, or Monitoring Only):	Complete	
Date On NPL:	1983	
ROD/ESD Date:	1984; 1989 (Amendment)	
Operable Unit:	N/A	
Areas of Concern (length or acres):	10 acres of a 37-acre harbor on Lake Michigan; abandoned boat Slip #3; and a North Ditch which flowed directly into Lake Michigan.	
Other Characteristics of Water Body:	Waukegan Harbor is an irregularly shaped harbor about 37 acres in area. The two areas of concern within the harbor were Slip #3 and the Upper Harbor. Sediment PCB concentrations in Slip #3 were typically greater than 500 ppm, with max. concentrations greater than 10,000 ppm. In the Upper Harbor, sediment PCB concentrations were between 50 and 500 ppm. A North Ditch about 2,000 feet long and 10-20 feet wide flowed into Lake Michigan about 160 yards north of the harbor. Mean daily discharge was measured at 1.8 cfs with a max. of 5.3 cfs. PCB concentrations in North Ditch soils ranged from 50 to > 10,000 ppm.	
Contaminants of Concern:	PCBs (1242 and 1248)	
Source of Contamination:	PCB-containing hydraulic fluid, Pydraul A-200, used in an adjacent die-casting works. Discharges to the harbor were typically into the western end of Slip #3. (This discharge pipe was sealed in 1976.)	
Contaminated Area Physical Characteristics:	<p>As described in the ROD (A-138), water depths in the harbor generally vary from 14 to 25 feet with some shallow depths in Slip #3. The harbor sediments consist of 1 to 7 feet of very soft organic silt (muck) overlying typically 4 feet of medium dense, fine to coarse sand. The sand is generally uncontaminated. A very stiff silt (glacial till) that typically ranges from 50 to more than 100 feet thick underlies the sand. The entire harbor is bordered by 20 to 25-foot long steel sheet piling, except at the Waukegan Port District boat launching areas and at the retaining wall near the harbor mouth. The sheet piles generally extend into the sand layer above the glacial till.</p> <p>As described in References C-260, E-2, and F-6: In June 1976, four surface sediment samples collected in the 10-acre Upper Harbor exhibited PCBs ranging from 74 to 301 ppm and two surface samples from Slip #3 exhibited PCBs of 3,900 and 10,300 ppm (the latter result was the mean of a replicate sample with discrete results of 4,200 and 16,400 ppm). In May 1976, six surface sediment samples were collected in the 27-acre Lower Harbor and the portion of the navigation channel within the harbor. The sample closest to the Upper Harbor exhibited 216 ppm PCBs. The other five samples ranged from 1.8 to 36 ppm PCBs. In July 1977, surface sediment samples were collected from 16 locations within the harbor. Three samples from Slip #3 exhibited PCBs ranging from 350 to 3,600 ppm. Five samples from the 10-acre Upper Harbor exhibited PCBs ranging from 36 to 460 ppm (median 140 ppm). The other eight samples from the Lower Harbor exhibited PCBs ranging from 0.8 to 26 ppm (median 10 ppm). In no instance, was the depth of sediment collected for the above surface samples identified.</p>	

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Type of Regulatory Action: Superfund. Final.

Overall Status Summary: The remediation project was completed in late 1994. A total of 50,000 cy of PCB-containing soils and sediments was remediated including 6,300 cy dredged from Slip #3 and 32,000 cy of sediment dredged from the Upper Harbor in late 1991 and early 1992. Slip #3, an abandoned boat slip, was prepared as a permanent containment cell. The 6,300 cy was treated by thermal desorption and returned to the cell. The 32,000 cy was pumped directly to the cell. The cell was capped and grassed-over after a 2.5-year settling period. Reassessment fish sampling was performed annually from 1993 to 1996 and a fish consumption ban was partially lifted in January 1997, leaving only a no-consumption advisory for common carp taken from the harbor. Reportedly, very few fish species other than the common carp routinely inhabit the harbor and therefore the collection and consumption of these other fish species from the harbor was expected to be sufficiently low to allow the lifting of the ban on their consumption.

EPA completed a five-year review in December 1997 and concluded that “the containment cells have been effective, and pumping, treating, and discharging of treated groundwater is continuing.”

Additional fish sampling (common carp only) has been performed annually by Illinois EPA since 1997, with the most recent data being from 2001. Prior to 1999, fish fillet samples were grouped by fish length, and each group of fillets was then composited and analyzed for PCBs and pesticides as a single sample. Since 1999, fillets from individual fish have been composited and analyzed. Results for 1999 through 2001 are: (1999) number of samples – 11, avg. fish length – 21.6 inches, and min., max., and avg. PCB concentrations – 0.29 ppm, 83.8 ppm, and 9.7 ppm, respectively; (2000) number of samples – 24, avg. fish length – 22.9 inches, and min., max., and avg. PCB concentrations – 0.1 ppm (MDL), 40 ppm, and 4.5 ppm, respectively; and (2001) number of samples – 12, avg. fish length – 25 inches, and min., max., and avg. PCB concentrations – 0.9 ppm, 15 ppm, and 4.7 ppm, respectively.

The maximum PCB concentrations recorded in 1999 and 2000, 83.8 ppm and 40 ppm, respectively, were considerably elevated when compared to results from previous years and to fish of similar size. To-date (April 2002), Illinois EPA reportedly believes these results are anomalies and will continue to collect annual fish samples for analysis, to compare vs. prior results and to evaluate if additional remedial actions are warranted in the harbor.

In assessing these annual fish results, it is important to recognize that a specific reduction in PCB levels in fish was not defined as a goal prior to remediation. The goal was to achieve a PCB cleanup level of 50 ppm or less in sediment, which was a level that modeling predicted would result in a negligible flux of PCBs from the harbor into Lake Michigan.

The harbor’s navigational channel is currently undergoing evaluation by the USACE for a deepening project to increase the depth of the navigational channel from about 19 feet to 23 feet. The increase in channel depth is necessary to allow access to the harbor by larger ships and because of historically low water levels currently being experienced throughout the Great Lakes region. The USACE originally proposed removing 300,000 cy of sediment identified as contaminated, based on 1994 sediment data from the harbor. Recent sediment samples show average PCB concentrations to be about 0.05 ppm in the harbor. Using the more recent sediment PCB data, the local community action group convinced the USACE to change the plan to remove only the sediment necessary to deepen the navigational channel, approximately 30,000 cy. Dredging is currently being held up awaiting the City of Waukegan to relocate a water main that crosses the navigational channel within the area to be dredged. The methods for sediment removal or disposal have yet to be determined.

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Remedial Action Planned: ☒

Risk Assessment: ☐

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

References: ☒

Modeling: ☒

Fishing Advisory: ☒

Key Conditions: confined disposal facility, dredging, Great Lakes AOC, hydrodynamic modeling, water handling limitations, thermal desorption

REMEDIAL ACTION PLANNED

Project Name	<u>OUTBOARD MARINE</u>	ProjectID: 05-12
Last Updated:	08/11/98	
Target Sediment Cleanup Standards (TSCS):	50 ppm PCBs	
How TSCS Established:	Modeling concluded that residual PCBs between 100 and 10 ppm left after dredging would result in a negligible PCB influx to Lake Michigan, near zero. Based on this, EPA set a 50 ppm PCB cleanup level. EPA calculated 96% PCB mass would be removed from the Upper Harbor if 50 ppm was met.	
Target Bank and Floodplain Cleanup Levels (if applicable):	N/A	
Other Target:	None	
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment:• Water:• Fish: B-149, B-151, G-2, M-73, P-6, P-26	
Estimated Target Volume:	10,900 cy of sediment exceeding 500 ppm PCBs in Slip #3; and 35,700 cy of Upper Harbor sediments, with PCB concentrations of 50-500 ppm.	
Planned Disposal Method:	Permanent containment in abandoned Slip #3, followed by capping. (From the Response Summary: "It was determined that construction of an approvable upland landfill was not feasible. Site selection studies conducted identified only one upland location for building an approvable TSCA landfill. Greater public exposure was a consideration due to dewatering and off-site transportation of contaminated materials. The complexities involved in the administrative process leading to the selection of a new landfill site in the State of Illinois were several. Moreover, it is unlikely that any new landfill could be constructed and permitted without a delay of 12 to 24 months. All parties agree that it is more desirable to achieve a cleanup sooner than to delay work for an undetermined period of time to obtain siting approval. The proposed remedial action meets the criteria for an alternate disposal method. Therefore, EPA has complied with TSCA requirements.")	
Estimated Calendar Time to Implement Remedy:		
Estimated Time to Implement Remedy:	2.5 years	
Estimated Cost to Implement Remedy:	about \$13 million (for Upper Harbor and Slip #3)	
Stated Remedial Action Objectives (and Source):	(Source: Amended ROD, March 30, 1989) No remedial action objectives, as such, are stated in the ROD. The nearest to a statement of objectives is contained in the Responsiveness Summary, appended to the ROD, which states the following: "The CERCLA remedial selection process requires EPA to consider the extent of cleanup necessary to protect human health and the environment, the feasibility of remedial alternatives and the cost effectiveness of various remedial options that meet protectiveness requirements. EPA does not believe that removal of all contaminated sediments is either feasible or necessary	

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to provide protection of human health and the environment."

"The 1981 HydroQual, Inc. report evaluated concentration ranges for residual PCBs in sediment and projected possible impacts to human and aquatic resources. The report concluded that residual concentrations between 100 and 10 ppm left after dredging would result in a PCB influx to Lake Michigan which approached zero. This, therefore, determined the protectiveness range. It represents a range which, if achieved, would virtually eliminate the Waukegan Harbor as a contributor to further contamination in Lake Michigan."

"Based on the HydroQual report, any remedy that establishes a sediment cleanup level of 100 ppm or less could be considered protective of human health and the environment. In order to provide an extra margin of safety and account for uncertainties inherent in the modeling process, EPA decided to require cleanup to the "50 ppm line" in order to assure protection of human health and the environment. Remedial alternatives based on a sediment cleanup level below 50 ppm raise technical and cost-effectiveness concerns. EPA had to consider the technical limitations inherent in the available dredging technology. Any dredging technique would involve some resuspension of sediment into the water column, and resettling back into the sediment. It may be difficult to assure that lower sediment levels could be achieved given the technological limitations. Such a technical challenge isn't necessary since protectiveness can be achieved by the 50 ppm level. Given these key concerns it became clear that the most conservative approach required to meet the protectiveness goals was represented by the 50 ppm concentration line."

"It should be emphasized that the decision regarding cleanup levels necessary to protect human health and the environment was based on site specific data. Site specific data were used in the HydroQual model. The final Agency decision with respect to the 50 ppm line was based on the model and other site specific conditions, and not on the basis of a mechanical application of the 50 ppm TSCA action level for dredged materials. Furthermore, the Agency believes that average PCB concentrations below the "50 ppm line" are lower than 50 ppm."

"Lake Michigan Federation also asserts that the 50 ppm clean up threshold will not result in compliance with the water quality standards, the GLWQA objective in whole fish, the IJC criteria of 10 ppm for sediment or the U.S. Fish and Wildlife proposed criteria of 0.05 ppm. The cited criteria listed for sediment and fish do not constitute binding requirements of federal or state law and are not considered ARARs that must be achieved through implementation of the selected remedy. As further explained, implementation of the proposed remedy essentially eliminates PCB influx to the Lake from the site."

Measures of Success to be Used:

Planned Monitoring and Restoration:

Not defined

Agency Position on Sediment Removal (and Source):

ROD Amendment, March 1989: "EPA considered the technical limitations inherent in available dredging technology, including resuspension of sediment into the water column, and resettling back into the sediment. EPA found it difficult to assure that sediment levels less than 50 ppm could be achieved given the technological limitations. It is emphasized that the cleanup level to protect human health and the environment was based on site specific data... and not on a mechanical application of the 50 ppm TSCA action level for dredged materials."

REMEDIAL ACTION IMPLEMENTED

Project Name:	<u>OUTBOARD MARINE</u>	ProjectID: 05-12
Last Updated:	04/08/02	
Physical Target:	Sediments in 10 acres of Upper Harbor and in Slip #3.	
Goals:	Remove sediments greater than 500 ppm PCBs from abandoned Slip #3, treat by thermal desorption to remove PCBs, and return treated sediments to Slip #3. Prepare Slip #3 as a permanent containment cell. Remove sediments greater than 50 ppm from the Upper Harbor and deposit in the Slip #3 containment cell.	
Primary Contractor:	Canonie Environmental	
Other Contractors:	SoilTech (thermal desorption)	
Generic Remediation Method:	Hydraulic dredging	
Equipment:	For Upper Harbor, a ten-inch cutterhead; silt curtain (anchored to bottom) at lower part of Upper Harbor and at entrance to operating Slip #4. For Slip #3, an 8-inch cutterhead.	
Material Handling:	<p>While dredging Slip #3, a polymer was added, through the dredge discharge line, to the dredged materials to enhance settlement of the dredged fines in the settling pond. The dredge materials were pumped to a settling pond in the West Containment Cell via 8-inch double contained HDPE piping. Dredged spoils were allowed to settle to the bottom of the pond. The supernatant water was pumped back to Slip #3 via an 8-inch double contained HDPE return pipe.</p> <p>While dredging the Upper Harbor, a polymer was added to the dredged materials to enhance settlement of the dredged fine materials. The dredge pumped the sediments to the Slip #3 Containment Cell via a 10-inch HDPE pipeline. Dredged sediment settled to the bottom of the slip and the supernatant water was pumped to a water treatment plant located near the containment cell. The effluent from the treatment plant flowed back to the Upper Harbor via a rerouted storm drain located along the south side of the Slip #3 containment cell.</p> <p>The Remedial Action Plan required that 90% primary consolidation be achieved in the Slip #3 sediment prior to installing the final cap. A series of five temporary and two permanent recovery wells were installed to promote sediment consolidation through dewatering of the cell. The water removed by the recovery wells was treated to <5 ppb PCBs, then pumped to a nearby storm drain which flowed to the Upper Harbor.</p> <p>A layer of clean sand was placed over the Slip #3 sediment after completion of the Upper Harbor dredging. The sand layer varied in thickness from approximately one foot at the east end to over three feet in the west end of the slip. The west end of the slip, which contained many of the fine silts that were dredged, was surcharged with clean sand to accelerate the consolidation of the sediments. The first surcharge, placed between December 9, 1992 and December 15, 1992, consisted of a 5-foot-thick sand layer placed over the western third of the sediments. A second surcharge, a one-foot sand layer, was placed over the western third of the sediments on August 2, 1993.</p> <p>The required 90% primary consolidation was verified as achieved on May 17, 1994, 2 years and 5 months after first placement.</p>	
Volume Removed:	50,000 cy including 32,000 cy from about 10 acres of Upper Harbor, 6,300 cy from Slip #3, and 11,700 cy from onshore ditch and lagoon areas.	
Calendar Time:	Overall, June 1991 to November 1994, after construction of a new (replacement) Slip #4 from November 1990 to May 1991.	

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Time To Implement:	Three years total; 2 weeks for dredging Slip #3 in December 1991; 8 weeks for dredging the Upper Harbor from January 3 to February 25, 1992. 2.5 years were required for sediments to settle to 90% consolidation in the nearshore CDF before the cap could be placed.	
Total Cost:	\$21 million total project; about \$15 million for soils/sediments; \$300 per cy.	
Dredging Cost:	Bid at \$30 - 40 per cy; reportedly achieved or bettered this rate.	
Disposal of Sediment:	<ul style="list-style-type: none">• Slip #4 built to replace Slip #3; Larsen Marine relocated from Slip #3 to new Slip #4.• Double sheetpile cut-off wall built to isolate Slip #3 from Upper Harbor; a watertight clay slurry wall was anchored to underlying clay till and Slip #3 became a permanent containment cell.• 6,300 cy of sediment in Slip #3 with PCB concentrations >500 ppm were removed with a small hydraulic dredge, treated by thermal desorption, then were returned to the cell. Details of the thermal desorption process are contained in Reference A-395. Approximately 32,000 cy of sediment in the Upper Harbor with PCB concentrations between 50 and 500 ppm were removed by hydraulic dredging and discharged into the Slip #3 containment cell.• Two other containment cells were built for onsite soils and ditch sediments. One encompassed the parking lot and the other the Crescent Ditch and Oval Lagoon, upstream of the North Ditch. Before construction, areas containing PCB contamination over 10,000 ppm were removed and treated using low temperature thermal desorption.	
Volume of Water:	95 million gallons	
Method of Water Treatment:	Water treatment with sand filtration; four pressure sand filters were used with a combined total flow capacity of 1,000 gpm.	
Water Discharge Limit:	15 ppb PCBs for water associated with dredging; discharge of treated water was back to the harbor within the silt-curtained area; consistently achieved less than 15 ppb.	
Air Monitoring During Remediation:	<p>Airborne concentrations were monitored through the collection of discrete ambient air samples on personnel using Gillian sampling pumps and perimeter air monitoring using high volume samplers with polyurethane foam sampling tubes. The high-volume samples were taken at fixed locations and analyzed at an offsite lab.</p> <p>The highest positive detection for PCBs in the personnel sampling program, NIOSH Method 5503, was 0.008 mg/m³ which is well below the TLV-PEL for PCBs of 1 mg/m³. The perimeter air monitoring results were compared against a standard of 2.31 µg/m³ established based on continuous exposure over a lifetime.</p> <p>All air sampling data for dredging activities in Slip #3 were below detection limits for personal samples and below action levels for perimeter sampling. The materials in Slip #3 contained the highest concentrations of PCBs of all materials to be dredged. Since the Upper Harbor contained lower concentrations, Amendment #3 was written to downgrade PPE from Level C to modified Level D for the remainder of dredging activities at the site.</p> <p>Analytical results from high volume air samples collected during Upper Harbor dredging were below detection limits and also below action limits.</p>	
Water Monitoring During Remediation:	Turbidity measurements were recorded daily during raking (of stones and debris) and dredging activities from depths of 10 and 20 feet on either side of the silt curtain and 500 feet south of the silt curtain in the Lower Harbor. Turbidity was measured in nephelometric turbidity units (NTUs) (the new industry standard) rather than in the specified Jackson turbidity units. The change was approved by EPA on December 18, 1991. The turbidity readings outside of the silt curtain were reportedly less than 17 NTUs, which was well below the 50 NTUs action level.	

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Outcome: No verification samples were collected for PCBs in the Upper Harbor; pre-defined areas were dredged to a pre-defined depth; sediment consistency was tested to determine that target depth had been reached. A pre-defined volume of sediment was removed to an underlying sand layer, which was expected to achieve less than 50 ppm PCBs in the Upper Harbor. As explained in Reference A-242: "Dredging was completed to a designated elevation or to a designated soil type such as clay till or sand, as required by the construction drawings. Upon completion of dredging activities, a bottom sampling program was performed to verify completion. The sampling program had two components. First, a recording fathometer depth sounder was used to determine the bottom elevation of the dredged area. Second, after the dredge soundings indicated that the elevation criteria had been met, soil samples from the harbor bottom were recovered at specified intervals to assure that the organic silts had been removed. If an adequate volume of soil was recovered from a specific sample point, the sample was passed through a No. 200 sieve. Dredging was considered complete, in areas dredged to clay till, when all samples were demonstrated to have at least 50 percent, by weight, of the collected material retained by a No. 200 sieve, or 4 inches or less of material was recovered during sampling."

"After completion of the Upper Harbor dredging and water treatment, the harbor water was sprayed with Nalcolyte, a potable coagulant, to aid in the settling of suspended particulate. The water treatment was completed on March 19, 1992. On March 20, 1992, 55 gallons of Nalcolyte were dispersed over the Upper Harbor. Consistent with the Remedial Action Plan, the silt curtains were removed 48 hours after the application of the coagulant, on March 23, 1992."

Restoration and Post-Monitoring:

A committee reviews PCB levels in six species of fish annually for both Lake Michigan and the harbor to determine trends. A reassessment of fish advisories was performed in 1996 based on recent sample results. In early 1997, new fish consumption advisories took effect for Lake Michigan that included lifting of a "do not eat" warning for all fish taken from Waukegan Old North Harbor, except common carp. Recent analytical results for fish collected from the harbor showed contamination levels similar to levels found in the same fish species collected from Lake Michigan. In addition, it was found that very few species of fish except common carp were being caught in the harbor, a fact that greatly reduced the potential for individuals to be exposed to PCBs via fish consumption. Fish advisories for Lake Michigan are now extended to the harbor and include a consumption ban on common carp only.

In April 1996, as reported in Reference A-309, Illinois EPA . . . "collected Harbor sediment samples to document the effectiveness of dredging." This was over four years after the dredging was completed. Twenty-nine locations were sampled. Each sample was a surficial sediment sample of 6" x 6" x 3" deep. Eleven of the 30 samples are archived in a freezer, unanalyzed. Two sample bottles were broken in transit. Results for the other 17 samples (one duplicate) ranged from 3 to 9 ppm PCBs. No information is presented on physical characteristics of the samples, i.e., were they sand or silt. No attempt is made in Reference A-309 to compare these results with historical results from the same stations. No definition is provided as to which sample locations are within the dredged area and which are outside.

The 17 samples were also analyzed for a wide-ranging suite of other parameters. Reference A-309 reports that all samples exhibited arsenic (11-120 ppm), copper (46-228 ppm), and lead (45-188 ppm) at levels which classify them as "heavily polluted" based on the "guidelines for pollutional classification of Great Lakes Harbor sediments (USEPA 1997)." Metals were not a consideration in the 1984 ROD or 1989 ROD Amendment.

Reference A-309 does not attempt to draw conclusions as to the success or failure of the remedial dredging or the meaning of these results. Reference A-309 does not define any follow up sampling or other actions.

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Site-Specific Difficulties: Silt curtain failures due to wind and wind-driven currents; material deposited into Slip #3 was temporarily capped with clean sand, but took about 2.5 years to settle sufficiently to allow capping to be completed. Upper Harbor dredging was prohibited during boating season (April 30 - October 30), and was accomplished during winter months.

Monitoring Data

References:

- **Sediment**
- **Water:**
- **Fish:** B-151, G-2, M-73, P-26

POTENTIALLY RESPONSIBLE PARTIES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

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 **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 135

Title: ***Superfund Record of Decision: Outboard Marine Corp. Site, IL
(selected pages)***

Location: AEM

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

Prepared by/Author: US EPA HQ

**Preparer/Author
Address:** Washington, D.C.

Prepared For: General Public

Date Published: May 15, 1984

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 136

Title: ***Treatment Quality Assurance Project Plan: Remedial Action -
Soil Treatment, Waukegan Harbor Site, Waukegan, Illinois***

Location: AEM

Category: Modeling

Prepared by/Author: Canonie Environmental Services (on behalf of the Waukegan Harbor Trust)

**Preparer/Author
Address:** Stockton, CA 95206

Prepared For: EPA Region V

Date Published: June 1990

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 137

Title: ***Declaration for the Record of Decision Amendment***

Location: AEM

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

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:** Chicago, IL

Prepared For: General Public

Date Published: March 31, 1989

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 138

Title: ***EPA Superfund Record of Decision: Outboard Marine
(Amendment), IL
(EPA/Rod/R05-89/096)***

Location: AEM

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

Prepared by/Author: US EPA HQ

**Preparer/Author
Address:** Washington, D.C.

Prepared For: General Public

Date Published: March 1989

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 190

Title: ***Remedial Action Plans: Construction Specifications Treatment
Design and Operations Plan Construction Quality Control
Procedures***

Location: AEM

Category: Remedial Action Plan/Work Plan

Prepared by/Author: Canonie Environmental

**Preparer/Author
Address:**

Prepared For: Waukegan Harbor Trust

Date Published: February 1991

**Key Words and
Phrases:**

REFERENCES

Project Name OUTBOARD MARINE

ProjectID: 05-12

Reference Type: A

ReferenceID: 192

Title: *A Status Report on the Presence of Polychlorinated Biphenyl Compounds (PCBs) in the Fishes of Lake Michigan: With Special References to the Waukegan Harbor Area (1971 through 1979) (Preliminary)*

Location: AEM

Category: Fish/Biota

Prepared by/Author: WAPORA

**Preparer/Author
Address:**

Prepared For: US EPA Region V

Date Published: 1981 circa

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 241

Title: *Construction Quality Control Procedures - Waukegan Harbor Site - Waukegan, Illinois*

Location: AEM

Category: Site Update

Prepared by/Author: Canonie Environmental

**Preparer/Author
Address:**

Prepared For: Waukegan Harbor Trust

Date Published: June 1990

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 242

Title: ***Construction Completion Report - Waukegan Harbor Remedial Action - Waukegan, Illinois***

Location: AEM

Category: Contaminated Sediments: Remediation Final Report

Prepared by/Author: Canonie Environmental

**Preparer/Author
Address:**

Prepared For: Waukegan Harbor Trust

Date Published: July 3, 1996

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 263

Title: ***Mathematical Modeling Estimate of Environmental Exposure Due to PCB-Contaminated Harbor Sediments of Waukegan Harbor and North Ditch***

Location: AEM

Category: Modeling

Prepared by/Author: Robert V. Thomann and Michael T. Kontaxis

**Preparer/Author
Address:** HydroQual, Inc.
Mahwah, NJ 07430

Prepared For: US EPA
Industrial Environmental Research Laboratory
Cincinnati, OH

Date Published: February 1981

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 271

Title: **Waukegan Harbor Fish Contaminant Data from the Final Stage I and II Waukegan Harbor Remedial Action Plan (two pages)**

Location: AEM

Category: Fish/Biota

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For:

Date Published: December 1994

**Key Words and
Phrases:** Listing of 1993 fish data

Reference Type: A

ReferenceID: 309

Title: **Assessment of Waukegan Harbor Sediment Contamination, April 1996**

Location: AEM

Category: Site Update

Prepared by/Author: John Lesnak

**Preparer/Author
Address:** Illinois State Environmental Protection Agency
Bureau of Water
Springfield, IL 62794

Prepared For: Distribution

Date Published: December 1997

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 395

Title: **Thermal Desorption at the Outboard Marine Corporation Superfund Site, Waukegan, Illinois**

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author: Federal Remediation Technologies Roundtable

**Preparer/Author
Address:**

Prepared For: General Public (<http://206.181.65.143/frtr/abstracts.html>)

Date Published: November 11, 1998 (last updated)

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 781

Title: **US EPA Region V: Five-Year Review Type Ia: Outboard Marine Corporation Site: Waukegan, Illinois**

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: September 30, 1997

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 782

Title: **Report of Findings: Waukegan Inner Harbor Sampling and Analysis**

Location: AEM

Category: Analytical Data

Prepared by/Author: U.S. Army Corps of Engineers

**Preparer/Author
Address:** Chicago District
111 North Canal Street
Chicago, IL 60606-7206

Prepared For: Unknown

Date Published: November 21, 1995

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: A

ReferenceID: 1063

Title: ***Evaluation of Toxicity and Bioaccumulation of Contaminants in Sediments Samples from Waukegan Harbor, Illinois (EPA-905-R-99-009)***

Location: AEM

Category: Contaminated Sediments: Characteristics/Bioavailability

Prepared by/Author: US EPA GLNPO

**Preparer/Author
Address:**

Prepared For:

Date Published: October 1999

**Key Words and
Phrases:**

Reference Type: A

ReferenceID: 1064

Title: ***Selected Documents (CD-ROM)***

Location: AEM

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

Prepared by/Author: Multiple

**Preparer/Author
Address:**

Prepared For:

Date Published: April 8, 2002

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 101

Title: ***OMC Project Nears Completion - One Million Pounds of PCBs Removed***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:** Chicago, IL

Prepared For: General Public

Date Published: July 1993

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: B

ReferenceID: 140

Title: ***Sign Removal Marks Milestone in Waukegan Harbor PCB Cleanup***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Illinois EPA

Preparer/Author Address: Springfield, IL 62794

Prepared For: News Release

Date Published: February 19, 1997

Key Words and Phrases:

Reference Type: B

ReferenceID: 144

Title: ***Dredging Up Toxic Sediments***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Bob Schacht

Preparer/Author Address: IL EPA
Maywood, IL 60153

Prepared For: AEM, Inc.

Date Published: October 16, 1995

Key Words and Phrases:

Reference Type: B

ReferenceID: 145

Title: ***Waukegan Harbor, Illinois: Overview***

Location: AEM

Category: Site Update

Prepared by/Author: Illinois EPA (from INTERNET)

Preparer/Author Address:

Prepared For: General Public

Date Published: 1992 circa

Key Words and Phrases:

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: B

ReferenceID: 146

Title: ***New Fish Consumption Advisories for Lake Michigan and Waukegan Harbor***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Illinois Dept of Public Health

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: January 23, 1997

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 147

Title: ***Descriptions of Sites: Illinois - Waukegan Harbor***

Location: AEM

Category: Site Update

Prepared by/Author: Illinois EPA (from INTERNET)

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: August 1993

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 148

Title: ***Waukegan Harbor Remediation Efforts Forge Ahead***

Location: AEM

Category: Site Update

Prepared by/Author: Illinois Dept of Public Health (from INTERNET)

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: 1996 Spring

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: B

ReferenceID: 149

Title: ***New PCB Data: PCB Concentrations in Fish Samples from Waukegan Harbor, Illinois***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Jim Clark, Coordinator

Preparer/Author Address: Great Lakes Fish Monitoring Program

Prepared For: Howard Zar, US EPA Region V Enforcement Division

Date Published: June 18, 1981

Key Words and Phrases:

Reference Type: B

ReferenceID: 150

Title: ***Letter re: Fish Sampling Data for Waukegan Harbor***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Sharyn K. Haney, FOIA Coordinator

Preparer/Author Address: State of IL EPA
Springfield, IL 62794

Prepared For: AEM, Inc.

Date Published: April 1, 1997

Key Words and Phrases:

Reference Type: B

ReferenceID: 151

Title: ***Fax Transmittal re: Fish Analysis Data for Waukegan Harbor***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Tom Hornshaw

Preparer/Author Address: State of IL EPA
Springfield, IL 62794

Prepared For: AEM, Inc.

Date Published: August 11, 1997

Key Words and Phrases:

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: B

ReferenceID: 720

Title: ***e-mail re: EPA News: Joint Federal/State Settlement with Bankrupt Outboard Marine Corp. Requires Interim Cleanup***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

Preparer/Author Address:

Prepared For: General Public

Date Published: July 25, 2002

Key Words and Phrases:

Reference Type: B

ReferenceID: 761

Title: ***Realizing Remediation I - Great Lakes Contaminated Sediments Waukegan Harbor - Outboard Marine Corporation Site (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:

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: B

ReferenceID: 813

Title: ***Realizing Remediation II - Updated Summary:
Waukegan Harbor - Outboard Marine Corporation Site
(see Reference A-907)***

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: July 2000

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 853

Title: ***News Release: EPA Regional Administrator, Army Corps Official
to Tour Waukegan Harbor Sampling Project, Jan. 14***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: January 13, 2003

**Key Words and
Phrases:**

Reference Type: B

ReferenceID: 1079

Title: ***Significant Activities Report: Sediment Results Reported***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA GLNPO

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: June - July 2003

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: C
Title: *OMC project nears completion*
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: Superfund Week
Date Published: July 30, 1993
Key Words and Phrases:

ReferenceID: 94

Reference Type: C
Title: *A heated-air stripping technique for removing PCBs from sediment (one page)*
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: Chemical Engineering
Date Published: August 6, 1984
Key Words and Phrases:

ReferenceID: 108

Reference Type: C
Title: *A new PCB-removal technique - sludge drying - will be tested*
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: Chemical Engineering
Date Published: August 22, 1983
Key Words and Phrases:

ReferenceID: 109

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: C

ReferenceID: 110

Title: ***Waukegan PCB project uses thermal process***

Location: AEM

Category: Contaminated Sediments: Treatment Technologies

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Engineering News-Record (ENR)

Date Published: October 7, 1991

**Key Words and
Phrases:**

Reference Type: C

ReferenceID: 238

Title: ***Outboard Marine cleanup plan due in a year***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author

Address:

Prepared For: Superfund Week

Date Published: May 17, 1996

**Key Words and
Phrases:** Coke Plant operable unit

Reference Type: C

ReferenceID: 260

Title: ***Horizontal and Vertical Distribution of PCBs in Southern Lake Michigan Sediments and the Effect of Waukegan Harbor as a Point Source***

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: Deborah L. Swackhamer and David E. Armstrong

Preparer/Author University of Wisconsin, Madison, WI

Address:

Prepared For: Journal of Great Lakes Research, Vol. 14, No. 3, pp 277-290

Date Published: 1988

**Key Words and
Phrases:**

REFERENCES

Project Name OUTBOARD MARINE

ProjectID: 05-12

Reference Type: C

ReferenceID: 584

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: D

ReferenceID: 22

Title: *Waukegan Harbor will be a good catch soon; Testing of fish shows low pollutant levels*

Location: AEM

Category: Site Update

Prepared by/Author: LeAnn Spencer

Preparer/Author

Address:

Prepared For: The Chicago (IL) Tribune - Lake Sports Final - Metro Lake Section

Date Published: January 24, 1997

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: D

ReferenceID: 67

Title: ***Groups Aim to Combine Cleanups Seek Lake Dredging to Fill Hole at Plant***

Location: AEM

Category: Site Update

Prepared by/Author: John Fink

**Preparer/Author
Address:**

Prepared For: The Chicago (IL) Tribune

Date Published: February 18, 1999

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 74

Title: ***EPA Completes 5-Year Review of Outboard Marine Site; Contaminants Remain Contained, Monitoring to Continue***

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:** Chicago, IL

Prepared For: General Public (Press Release)

Date Published: December 15, 1997

**Key Words and
Phrases:**

Reference Type: D

ReferenceID: 239

Title: ***PCB-contaminated concern over Waukegan Harbor pollution***

Location: AEM

Category: Site Update

Prepared by/Author:

**Preparer/Author
Address:**

Prepared For: The Associated Press

Date Published: January 1, 2001

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: D
Title: *Looking for hot spots*
Location: AEM
Category: Site Update
Prepared by/Author: Frank Abderholden
Preparer/Author Address:
Prepared For: Unknown
Date Published: 2002 circa
Key Words and Phrases:

ReferenceID: 483

Reference Type: D
Title: *Harbor cleanup elusive - - Waukegan worries over depth of dredging and responsibility for landfill*
Location: AEM
Category: Site Update
Prepared by/Author: Trine Tsouderos
Preparer/Author Address:
Prepared For: The Chicago (IL) Tribune
Date Published: February 13, 2004
Key Words and Phrases:

ReferenceID: 519

Reference Type: E
Title: *An Overview of Bottom Sediment Problems in Saginaw River and Bay, Marinette-Menominee Harbor, and Waukegan Harbor*
Location: AEM
Category: Site Update
Prepared by/Author: Karl E. Bremer
Preparer/Author Address: US EPA Region V
Chicago, IL
Prepared For: Proceedings of Third U.S. - Japan Experts Meeting (EPA 600/3-78-084 9/78)
Date Published: September 1978
Key Words and Phrases:

ReferenceID: 2

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: E

ReferenceID: 241

Title: ***Remediation of Sediments by Dredging: Methods and Case Histories***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Bradford S. Cushing

Preparer/Author Address: AEM, Inc.

Prepared For: WODCON XV Conference, Las Vegas, NV

Date Published: June 28 - July 2, 1998

Key Words and Phrases:

Reference Type: F

ReferenceID: 6

Title: ***Chapter 21:
Lake-wide Impacts of Long-term Sources of Xenobiotic Contaminants:
Lake Managua (Nicaragua) and Lake Michigan (United States)***

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: Wayland R. Swain

Preparer/Author Address: University of Amsterdam, The Netherlands

Prepared For: Toxic Contamination in Large Lakes, Volume III (Lewis Publishers)

Date Published: 1986 circa

Key Words and Phrases: Waukegan Harbor

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: G

ReferenceID: 2

Title: ***Waukegan Harbor: Pre and Post Dredging Concentrations in Fish (overheads)***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Milt Clark

**Preparer/Author
Address:**

Prepared For: Fox River PRP Group

Date Published: November 13, 1997

**Key Words and
Phrases:**

Reference Type: G

ReferenceID: 8

Title: ***Overheads Re: Dredging Successes (including Waukegan Harbor)***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Jim Hahnenberg

**Preparer/Author
Address:** US EPA Region V
Chicago, IL

Prepared For: Presentation to Fox River Group

Date Published: November 1997

**Key Words and
Phrases:**

Reference Type: G

ReferenceID: 13

Title: ***Dredging Successes***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Jim Hahnenberg

**Preparer/Author
Address:** US EPA Region V
Chicago, IL

Prepared For: Fox River PRPs

Date Published: November 13, 1997

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: I

ReferenceID: 3

Title: *Developer of Soil Remediation Technology (vendor literature)*

Location: AEM

Category: Site Update

Prepared by/Author: SoilTech

**Preparer/Author
Address:** San Mateo, CA 94402

Prepared For: General Public

Date Published: 1990s

**Key Words and
Phrases:**

Reference Type: J

ReferenceID: 11

Title: *Subject: Sediment Removal Projects - Black River (see M-58),
Waukegan Harbor (see M -59), Collingwood Harbour (see M-60)*

Location: AEM

Category: Site Update

Prepared by/Author: General Electric Co. (transmitting project summaries)

**Preparer/Author
Address:** Albany, NY

Prepared For: Distribution

Date Published: April 16, 1998

**Key Words and
Phrases:**

Reference Type: J

ReferenceID: 13

Title: *Waukegan Harbor - Outboard Marine Corporation Site*

Location: AEM

Category: Site Update

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:** Chicago, IL

Prepared For: Internet Website

Date Published: Undated

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: L

ReferenceID: 6

Title: ***Memo re: Waukegan Harbor AOC Use Impairment
Reassessment 1995***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

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

Prepared For: Internal file

Date Published: August 5, 1997

**Key Words and
Phrases:**

Reference Type: L

ReferenceID: 46

Title: ***Memo re: Waukegan Harbor Sediment Sampling***

Location: AEM

Category: Contaminated Sediments: Investigation/Delineation

Prepared by/Author: AEM, Inc.

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

Prepared For: Distribution

Date Published: August 11, 1998

**Key Words and
Phrases:**

Reference Type: L

ReferenceID: 180

Title: ***EPA's Evolving Position on Remedial Dredging***

Location: AEM

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

Prepared by/Author: AEM, Inc.

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

Prepared For: Internal Distribution

Date Published: Undated

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: L
Title: **Waukegan Harbor Fish Data (Spreadsheets)**
Location: AEM
Category: Fish/Biota
Prepared by/Author: AEM, Inc.
Preparer/Author Address: Malvern, PA 19355
Prepared For: Internal file
Date Published: August 6, 1997
Key Words and Phrases:

ReferenceID: 191

Reference Type: M
Title: **Rates of Microbial Dechlorination of Polychlorinated Biphenyls (PCBs) in Anaerobic Sediments from Waukegan Harbor**
Location: AEM
Category: Site Update
Prepared by/Author: J.B. Risatti
Preparer/Author Address: Illinois State Geological Survey
Prepared For: Illinois Hazardous Waste Research and Information Center
Date Published: August 1992
Key Words and Phrases:

ReferenceID: 27

Reference Type: M
Title: **Commercial Treatment at the Waukegan Harbour Superfund Site**
Location: AEM
Category: Site Update
Prepared by/Author:
Preparer/Author Address:
Prepared For: CoSTTeP ATP presentation
Date Published: January 1993
Key Words and Phrases:

ReferenceID: 34

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: M

ReferenceID: 59

Title: ***PCB Contaminated Sediment Remediation in Waukegan Harbor***

Location: AEM

Category: Site Update

Prepared by/Author: Illinois EPA (from INTERNET)

**Preparer/Author
Address:**

Prepared For: General Public

Date Published: 1998

**Key Words and
Phrases:** Historical fish data listing

Reference Type: M

ReferenceID: 73

Title: ***PCB Concentration in Fish Collected from Waukegan Harbor
(three pages)***

Location: AEM

Category: Fish/Biota

Prepared by/Author: Jim Quadrini

**Preparer/Author
Address:** HydroQual, Inc.
Mahwah, NJ 07430

Prepared For: AEM, Inc.

Date Published: April 30, 1997

**Key Words and
Phrases:**

Reference Type: M

ReferenceID: 254

Title: ***Environmental Dredging: An Evaluation of Its Effectiveness in
Controlling Risks***

Location: AEM

Category: Contaminated Sediments: Overview of Issues

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

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

Prepared For: General Electric Company

Date Published: August 2000

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: M

ReferenceID: 345

Title: ***Memo re: Summary of the Impacts of Remedial Dredging***

Location: AEM

Category: Miscellaneous

Prepared by/Author: Quantitative Environmental Analysis, LLC.

Preparer/Author

Address:

Prepared For: Internal Distribution

Date Published: February 27, 2001

**Key Words and
Phrases:**

Reference Type: M

ReferenceID: 421

Title: ***Results of Contaminated Sediment Cleanups Relevant to the
Hudson River:
Waukegan Harbor, Illinois (Outboard Marine)***

Location: AEM

Category: Contaminated Sediments: Overview of Issues

Prepared by/Author: Joshua Cleland

Preparer/Author

Address:

Prepared For: Scenic Hudson
9 Vassar Street
Poughkeepsie, NY 12601

Date Published: October 2000

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: M

ReferenceID: 452

Title: ***Ecological Benefits of Contaminated Sediment Remediation in the Great Lakes Basin***

Location: AEM

Category: Site Update

Prepared by/Author: Michael A. Zarull, John H. Hartig, Lisa Maynard

**Preparer/Author
Address:**

Prepared For:

Date Published: August 1999

**Key Words and
Phrases:**

Reference Type: P

ReferenceID: 6

Title: ***Worksheet re: Tabular Summary of Waukegan Harbor Fish PCB Data***

Location: AEM

Category: Fish/Biota

Prepared by/Author: AEM, Inc.

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

Prepared For: Internal file

Date Published: August 13, 1997

**Key Words and
Phrases:**

Reference Type: P

ReferenceID: 26

Title: ***Residues in Waukegan Harbor: Carp Fillets 1983 - 2001***

Location: AEM

Category: Fish/Biota

Prepared by/Author: US EPA Region V

**Preparer/Author
Address:**

Prepared For: Distribution

Date Published: April 2002

**Key Words and
Phrases:**

REFERENCES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Reference Type: R

ReferenceID: 19

Title: ***Letter to PRP re: Case Histories: Contaminated Sediment Sites***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

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

Prepared For: Outboard Marine Corporation, submitted to

Date Published: August 19, 1998

**Key Words and
Phrases:**

Reference Type: R

ReferenceID: 33

Title: ***Letter to PRP re: Case Histories: Contaminated Sediment Sites***

Location: AEM

Category: Site Update

Prepared by/Author: AEM, Inc.

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

Prepared For: Outboard Marine Corporation, submitted to

Date Published: May 13, 1999

**Key Words and
Phrases:**

MODELING

Project Name: OUTBOARD MARINE

ProjectID: 05-12

Last Updated: 04/20/99

Modeling Performed: Hydrodynamic model of the harbor and the North Ditch.

Modeling Objectives:

Modeling Description: As described in Reference A-263: "A mathematical model of the Harbor, calibrated to chloride, suspended solids and dye data" was developed; also, "a mathematical model of suspended solids and PCB transfer in the North Ditch was constructed with principles similar to that of the Harbor and was calibrated to data collected in 1979."

Company Performing Modeling: HydroQual, Inc.

Modeling Status: Complete

Modeling Summary: A condensation of the conclusions presented in 1981 Reference A-263 follows:

- "The "best estimate" of the mass of PCB residing in the sediments of Waukegan Harbor and the North Ditch is 1,100,000 lbs. About 43% of this mass is in Waukegan Harbor and about 95% of the mass in the Harbor is contained in Slip #3."
- "An approximate horizontal exchange across the Harbor-Lake boundary equivalent to a flow of about 140 ft³/s was calculated. This exchange flow is due to the natural process of water movement between the Harbor and Lake. The model was calibrated to the PCB data in the water column using existing PCB sediment concentrations as the primary input."
- "At present, the calculations indicate that the net exchange of PCB from the Harbor to the Lake is about 10 kg/yr (22 lb/yr), including transient storm events."
- "For the North Ditch, an average discharge of about 2 kg/yr (4.4 lb/yr) is estimated based on both observed data for 1979 and model calibrations. A simulation of a single storm event equivalent to the maximum expected event in an average year resulted in the discharge of an additional approximate load of 3 kg (7 lbs). The total discharge from the North Ditch is about 5 kg/yr (11 lb/yr)."
- "The total present discharge (of PCBs) to Lake Michigan from the Harbor/Ditch system is therefore about 15 kg/yr."
- "The best estimate" of 15,000 kg/yr discharged to Lake Michigan during PCB product usage is at least 100-1,000 times greater than the present estimated discharge of 10-20 kg/yr."
- "Calculations indicate that dredging of contaminated Waukegan Harbor sediment to levels of approximately 10-100 ppm would probably eliminate the present discharge of PCB from the Harbor to the Lake."
- "Removal of PCB-contaminated sediment to 100 ppm results in a calculated significant drop in fish body burdens to less than 5 ppm (the then-prevailing FDA limit) for all but the innermost 500 m of the Harbor."
- "Removal of PCB-contaminated sediment to 10 ppm is estimated to result in fish body burdens in the Harbor to levels of about 3 ppm."

MODELING

Project Name: **OUTBOARD MARINE**

ProjectID: 05-12

Last Updated: 04/20/99

- "Additional removal of PCB-contaminated sediment to 1 ppm does not result in marked improvement in water quality or any further marked reductions in fish body burdens."

FISH ADVISORIES

Project Name **OUTBOARD MARINE**

ProjectID: 05-12

Advisory: Lake Michigan-Old North Harbor, Waukegan ***AdvisoryID:*** 228
Extent: Old North Harbor, Waukegan
Pollutant: PCBs (total)
Species: alewife
Population: NCGP
Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Great Lake ***Advisory Number:*** 2150
Status (Active or Rescinded): Rescinded ***Date Rescinded:*** 12/31/99
Contact Name: Dr. Francis Okino ***Contact Number:*** 217-785-2439

Advisory: Lake Michigan-Old North Harbor, Waukegan ***AdvisoryID:*** 229
Extent: Old North Harbor, Waukegan
Pollutant: PCBs (total)
Species: carp-common
Population: NCGP
Population Definition: No Consumption-General Population: Advise against consumption by the general population.

Advisory Type: Great Lake ***Advisory Number:*** 2150
Status (Active or Rescinded): Rescinded ***Date Rescinded:*** 12/31/99
Contact Name: Dr. Francis Okino ***Contact Number:*** 217-785-2439
