



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 5  
77 WEST JACKSON BOULEVARD  
CHICAGO, IL 60604-3590

16 JUL 2014

REPLY TO THE ATTENTION OF:

Mr. Marc Miller  
Director  
Illinois Department of Natural Resources  
One Natural Resources Way  
Springfield, Illinois 62702-1271

Dear Marc:

Thank you for your June 20, 2014 request to remove the "Restriction on Dredging" Beneficial Use Impairment (BUI) at the Waukegan Harbor Area of Concern (AOC) in Illinois. As you know, we share your desire to restore all of the Great Lakes AOCs and to formally delist them.

Based upon a review of your submittal and the supporting data, the U.S. Environmental Protection Agency hereby approves your BUI removal request at the Waukegan Harbor AOC. In addition, EPA will notify the International Joint Commission of this significant positive environmental change at this AOC.

We congratulate you and your staff, as well as the many federal, state, and local partners who have worked so hard and have been instrumental in achieving this important environmental improvement. This progress will benefit not only the people who live and work in the Waukegan Harbor AOC but all the residents of Illinois and the Great Lakes basin as well.

We look forward to the continuation of this important and productive relationship with your agency and local coordinating committees as we work together to delist this AOC in the years to come. If you have any further questions, please contact me at (312) 353-4891, or your staff may contact John Perrecone, at (312) 353-1149.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Korleski".

Chris Korleski, Director  
Great Lakes National Program Office



## Illinois Department of Natural Resources

One Natural Resources Way · Springfield, Illinois 62702-1271  
[www.dnr.illinois.gov](http://www.dnr.illinois.gov)

Pat Quinn, Governor  
Marc Miller, Director

June 20, 2014

Mr. Chris Korleski  
Director – Great Lakes National Program Office  
U.S. Environmental Protection Agency  
77 West Jackson  
Chicago, Illinois 60604

Subject: Removal of the Dredging Restrictions BUI in the Waukegan Harbor AOC

Dear Mr. Korleski,

The purpose of this letter is to request that the U.S. Environmental Protection Agency – Great Lakes National Program Office (USEPA-GLNPO) approve the removal of the Restriction on Dredging Beneficial Use Impairment (BUI) in the Waukegan Harbor Area of Concern (AOC). The management actions for this BUI have been completed and dredging restrictions should no longer be considered a BUI in the AOC.

Under the direction and leadership of Governor Pat Quinn, the Illinois Department of Natural Resources has worked closely with the Waukegan Harbor Citizens' Advisory Group (CAG) to evaluate the delisting target, which is consistent with the U.S. Policy Committee's *Delisting Principles and Guidelines* document. The delisting target states that "dredged material within the AOC is of suitable quality for "open water" disposal, unrestricted upland use, or beach nourishment." The IDNR has assessed the final data of the remedial actions accomplished through the Superfund Program, and found that PCB concentrations (surface-weighted average concentration-SWAC) were lower than the original target SWAC (0.2 ppm). The overall harbor PCB concentration (SWAC), following environmental dredging equaled 0.0604 ppm. IDNR and the CAG feel that the Waukegan Harbor AOC has met the criterion for the Dredging Restrictions BUI and that the BUI should be removed from the list of impairments in this AOC.

Enclosed, please find the supporting documentation for the removal of the Dredging Restrictions BUI in Waukegan Harbor AOC, including the proposal to remove this BUI; documentation on public outreach; and a recommendation letter from the Waukegan Harbor CAG.

We look forward to our continuing partnership with the RAP AOC program and working closely with the U.S. EPA-GLNPO to achieve more delisting targets.

Sincerely,

A handwritten signature in black ink, appearing to read "Marc Miller", with a stylized flourish at the end.

Director Marc Miller

cc: John Perrecone, USEPA w/o attachments  
Bill Bolen, USEPA w/o attachments  
Susie Schreiber, Waukegan Harbor CAG

**Waukegan Harbor Area of Concern  
Proposed Recommendation for Removal of the Restrictions on Dredging Activity  
Beneficial Use Impairment (Dredging BUI)**



Illinois Department of Natural Resources  
Office of Coastal Management  
April, 2014



## Purpose

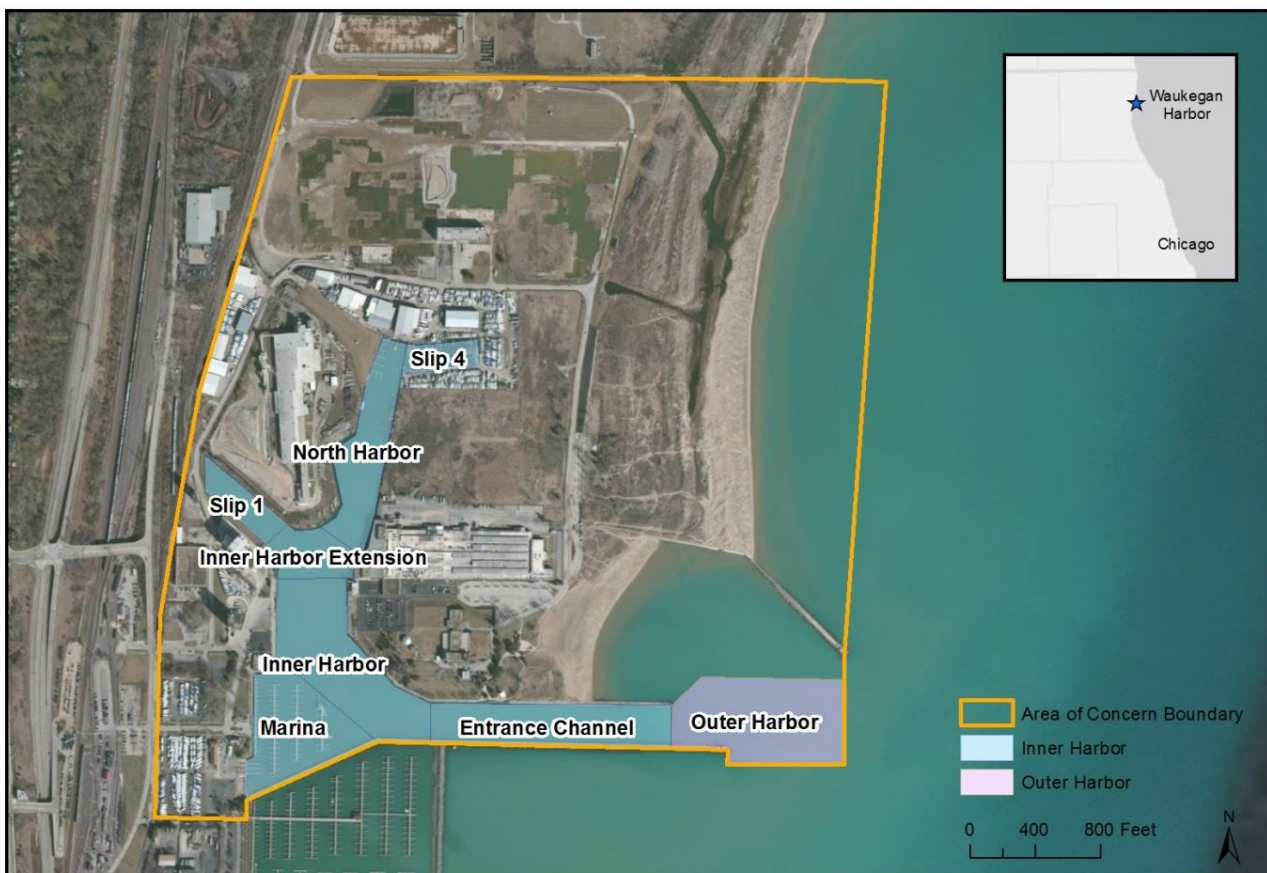
The purpose of this document is to summarize activities that have been done to remove PCBs, other substances, and issues that inhibit unrestricted dredging in Waukegan Harbor, and to provide the rationale for removal of the Restrictions on Dredging Activity (Dredging) Beneficial Use Impairment (BUI) in the Waukegan Harbor Area of Concern (AOC).

## Overview of Area of Concern

Waukegan Harbor is located on the west shore of Lake Michigan in Waukegan, Illinois, approximately forty miles north of Chicago. The harbor is surrounded by industrial, commercial, municipal, recreational, open and vacant lands (Figure 1). In 1975, polychlorinated biphenyl (PCB) contamination was discovered in Waukegan Harbor as a result of manufacturing activities at Outboard Marine Corporation (OMC).

In 1981, the International Joint Commission (IJC) identified Waukegan Harbor as an Area of Concern (AOC) and identified six Beneficial Use Impairments (BUIs) for the harbor. The AOC is bounded on the north by the North Ditch; on the west by Canadian National Railway; and on the south by Government Pier.

**Figure 1. Waukegan Harbor and Area of Concern boundary.**



The 1987 amendments to the Great Lakes Water Quality Agreement further defined the BUIs. Identified BUIs for the Waukegan Harbor AOC are as follows:

1. Restriction on dredging activities;
2. Degradation of benthos;
3. Degradation of phytoplankton and zooplankton populations;
4. Restrictions on fish and wildlife consumption;
5. Loss of fish and wildlife habitat; and,
6. Beach closings.

The first four BUIs are the result of industrial contamination from the manufacturing activities at OMC where hydraulic fluids containing PCBs were discharged through floor drains at the OMC plant, and were released directly into Waukegan Harbor via old slip 3 and the North Ditch.

The fifth BUI is a result of the urbanized and industrialized nature of the Waukegan Harbor lakefront and the impact of the resulting contaminants on fish and wildlife. The harbor area of the Waukegan Harbor AOC has limited wildlife and fish habitat due to the industrial nature of the harbor. The wildlife habitat that exists is threatened by invasive species. A habitat management plan was developed for the AOC and this BUI was removed in 2013. The majority of the invasive species are being removed under the Waukegan harbor Citizens' Advisory Group's (CAG) Great Lakes Restoration Initiative grant.

The sixth BUI, beach closings, is primarily the result of high bacteria levels from fecal contamination and gull activity on the two beaches within the confines of the Waukegan Harbor AOC. These issues have been resolved, and this BUI was removed in 2011.

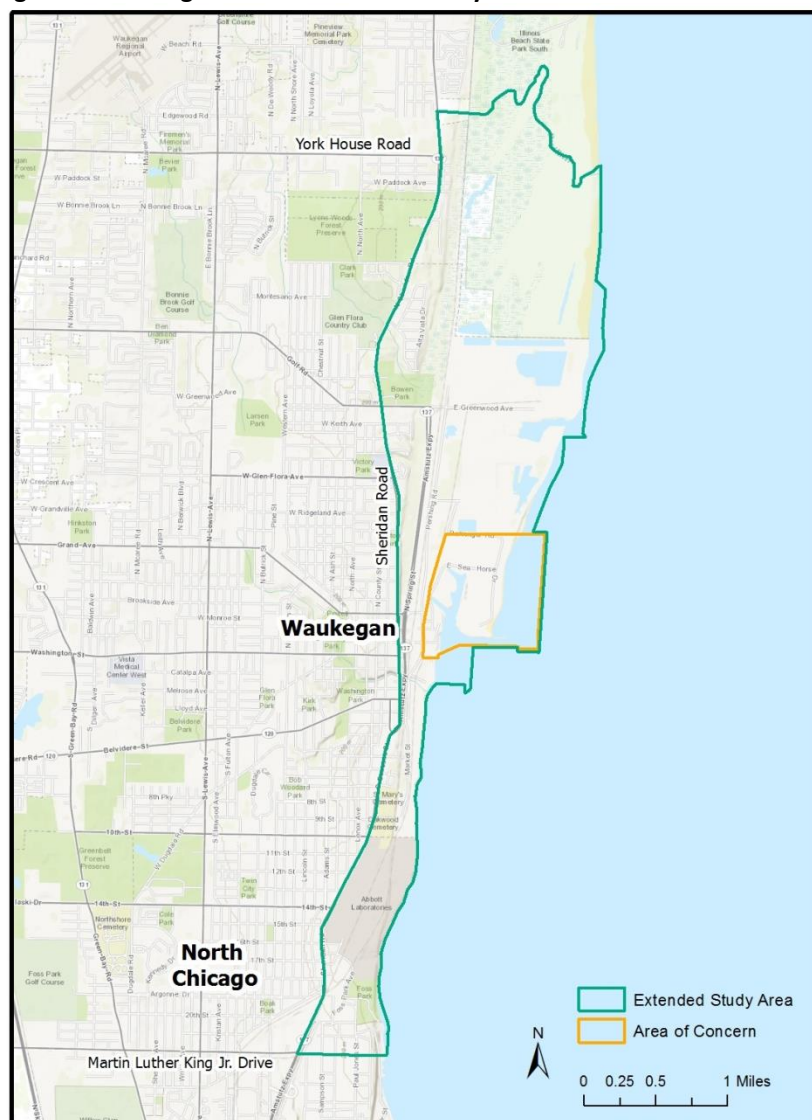
At the present time, the Waukegan Harbor AOC is jointly managed by the Illinois Department of Natural Resources (IDNR), the Illinois Environmental Protection Agency (IEPA), and the Waukegan Harbor Citizens Advisory Group (CAG). Immediately following the formation of the Waukegan Harbor CAG, the IEPA, CAG and the public met and developed what is known as the Waukegan Harbor Extended Area of Concern (EAOC). The EAOC addresses additional known areas of contamination that affect the Waukegan Harbor vicinity and impact the nearshore waters of Lake Michigan. The EAOC extends from the Dead River south into the City of North Chicago, ending at 22<sup>nd</sup> St. and includes the lands east of Sheridan Road (Figure 2). While sites within the EAOC are critical to the health and sustainability of Waukegan Harbor and surrounding communities, the dredging BUI is focused in the AOC only, and restrictions on dredging activities do not extend to the EAOC.

The following actions had to occur before any PCB clean up could be started in Waukegan Harbor:

1. The area known as "No Man's Land" was identified and designated as the Inner Harbor Extension of the Federal Channel through the Water Resources Development Act of 2000.
2. The water lines and electric lines running just under the bottom of the harbor were upgraded and lowered well below a depth needed for dredging and navigational safety.
3. The Superfund programs at USEPA and Illinois EPA established a risk-based remediation target of 0.25 parts per million (ppm) PCBs in sediments with no single sample above 1 ppm for Waukegan Harbor.

These actions were achieved through concerted efforts by U.S. Senator Mark Kirk, IEPA, Waukegan Harbor CAG, Waukegan Port District, the harbor industries, and other partners.

**Figure 2. Waukegan Harbor Extended Study Area**



## Public Input

The primary driver for the final PCB clean-up at Waukegan Harbor was the Superfund program, administered by US Environmental Protection Agency (USEPA). USEPA, in consultation with Illinois EPA, issued a proposed plan for cleanup of the Waukegan Harbor AOC site for public review and comment on November 3, 2008. USEPA placed the proposed plan and other site documents into the Administrative Record, and in the information repository maintained at the USEPA Records Center (USEPA Region 5, 77 W. Jackson Blvd., Chicago, IL), and the USEPA Waukegan AOC and Extended AOC Information Repository in the Waukegan Public Library (128 N. County St., Waukegan, IL). In November 2008, USEPA placed two notices (one in English and the other in Spanish) noting the availability of the proposed plan and other documents in the *Waukegan News-Sun* and the *Nueva Semana*, respectively. Each is an area newspaper of wide circulation. The proposed plan was also printed in Spanish, and USEPA brought copies to area churches to distribute to parishioners.

USEPA scheduled a public comment period on the proposed plan from November 3, 2008, to January 5, 2009. USEPA held a public meeting on November 13, 2008, in Waukegan to present the proposed plan and take public comments. The Agency answered questions about the actual and potential health risks posed by contaminants at the site and the remedial alternatives that the Agency evaluated in response to the health risks. USEPA's responses to public comments received during the comment period are included in the Responsiveness Summary section of the Record of Decision. Initially, the public comment period was scheduled to run until January 5, 2009; however, the City of Waukegan requested, and was granted, a 30-day extension of the comment period until February 4, 2009 (USEPA 2009).

The Waukegan Harbor Citizens Advisory Group (CAG) has been tracking cleanup progress in Waukegan Harbor since August of 1990. This group of concerned citizens, area businesses, municipal representatives, and local, regional, state, and federal environmental and educational organizations meets once a month to discuss local environmental issues and to support harbor cleanup efforts. Representatives of state and federal agencies attend the CAG meetings to report on progress and gather input.

### **Restriction on Dredging Activities BUI**

Waukegan Harbor is a deep draft commercial harbor. The Harbor, in its entirety, includes the following named sections: the Outer Harbor, Entrance Channel, Marina, Inner Harbor, Inner Harbor Extension, Slip 1, North Harbor, and Slip 4 (Figure 1). The US Army Corps of Engineers (USACE) is charged with maintaining the depth of the Federal Navigation Channel at 18 feet below the Low Water Datum (LWD) for Lake Michigan. The Approach Channel (not shown), Outer Harbor, Entrance Channel, Inner Harbor, and Inner Harbor Extension segments comprise the Federal Navigation Channel (Figure 5). References to the non-federal portions of the Inner Harbor include Slip 1, Slip 4, North Harbor, and the Marina.

The dredging BUI is restricted to the harbor itself. No restrictions exist for the Approach Channel. The authorized depth for the Outer and Inner Harbor is 18 feet. The Lake Michigan Approach Channel is authorized to a depth of 22 feet. The Outer and Inner Harbor areas have not been dredged for over 27 years due to the contaminants present in the sediment. The average loss of depth in the outer harbor area is between 5-6 feet, impacting both recreational uses and commercial transportation in the Harbor (USACE 2013).

Due to shallow harbor depth, commercial vessels entering the harbor have a reduction in cargo capacity by up to 40 percent. Vessels are often required to off-load cargoes in Milwaukee in order to enter Waukegan (Great Lakes Dredging Team 2003). Recreational uses by deeper draft vessels are also negatively impacted by the lack of harbor dredging. Additionally, Waukegan Harbor is recognized by the US Coast Guard as the only harbor of refuge between Calumet Harbor, Illinois and Milwaukee, Wisconsin, providing safe operation for barges and commercial vessels operating on Lake Michigan during inclement weather. Dredging of the harbor will ensure that this safety function continues to be available (ECT 2008).

### **Remedial Action Plans and Restoration Targets**

In 1990, the Waukegan Harbor Citizens Advisory Group (CAG), formed by the Illinois Environmental Protection Agency (IEPA) to assume a leadership role in the development of Remedial Action Plans (RAP) for the AOC, completed the Stage I RAP in 1993, the Stage II RAP in 1995, and the Stage III RAP in 1999. The final RAP identified restoration goals for each of the six BUIs. However, these restoration goals were established before USEPA published "Restoring United States Areas of Concern: Delisting Principles and Guidelines" in December of 2001. As a result, USEPA and IEPA funded a project to review, revise and



update the restoration goals listed in the Stage III RAP using the consultant, Environmental Consulting & Technology, Inc. and a technical team that included the Waukegan Harbor CAG and IEPA.

The resulting document, "Delisting Targets for the Waukegan Harbor Area of Concern: Final Report," was completed in October 2008. This document, identifying specific delisting targets, was a cooperative effort of expert personnel knowledgeable regarding the local conditions in the AOC and representing the international, federal, state, regional, and community levels. This report is the current guiding document for RAP and delisting activities for the Waukegan Harbor AOC. This document provides the definitive guidance to determine at what point the AOC is "clean" enough that the impaired beneficial uses can be considered for delisting.

As identified in "Delisting Targets," the specific restoration criteria for delisting the dredging BUI are:

1. Dredged material within the AOC is of suitable quality for "open water" disposal, unrestricted upland use, or beach nourishment.

Or, where dredged material quality does not meet the above criterion:

2. A comparison of sediment contaminant data from the commercial or recreational navigation channel in the AOC indicates that contaminant levels are not statistically different from other comparable, non-AOC commercial or recreational navigation channels (ECT 2008).

#### ***Record of Decision Amendment***

Following the agreement upon Delisting Targets, a Record of Decision (ROD) Amendment was finalized between USEPA and the State of Illinois in October 2009. The following subset of pertinent tasks were agreed to as part of the Superfund program to clean up the OMC operable unit 1, which includes Waukegan Harbor.

- Hydraulically dredge sediment from the harbor where the polychlorinated biphenyl (PCB) concentration exceeds 1 *mg/kg* (or "part per million" – ppm)
- Dewater the dredged sediment in Geotubes® (or an equivalent geotextile product) and consolidate the dewatered sediment into a cell on the OMC Plant 2 site;
- Filter recovered water and discharge by diffusion back into the harbor;
- Place a cap on sediment next to harbor walls that cannot be safely dredged;
- Place a six-inch sand layer on the dredged harbor areas to achieve a 0.2 ppm PCB surface-weighted average concentration (SWAC) in the sediment; and
- Monitor PCB levels in harbor-caught fish and sediment to track cleanup progress.

Through the ROD, agreed to by the USEPA and the State of Illinois, the "implementation of the selected remedial action herein will not place restrictions on future maintenance dredging activities by the United States Army Corps of Engineers in the non-capped areas of the harbor" (USEPA 2009).

## Remedial Actions Implemented to Address the Dredging BUI

The Harbor in Waukegan is one of four areas that make up the OMC Superfund site. USEPA began cleanup work at the OMC Superfund site in the early 1980s. Specific to the harbor, initial sediment cleanup of the harbor was performed in 1992-1993, resulting in the removal of approximately 90% of the total PCB contamination released. In 2002, the USEPA Region 5 Superfund Division conducted a 5-Year Review of the site to determine the extent to which the 1992-93 efforts were successful in protecting human health and the environment. USEPA, IEPA, and the area stakeholders decided upon a second cleanup action for Waukegan Harbor because PCB levels in harbor-caught fish were still too high to be protective of human health.

Starting in August 2004, a series of stakeholder meetings were convened for the purpose of determining common goals between the governmental entities and other parties in order to develop remedial alternatives for Waukegan Harbor. Through these meetings, the stakeholders narrowed the list of possible remedies and submitted an application for Great Lakes Legacy Act (GLLA) funding. Legacy Act funding was received, and from 2005-2007 all required planning and sediment testing for the Legacy Act remedial cleanup of Waukegan Harbor took place with the involvement of all the regulatory agencies, harbor industries, and local stakeholders. On August 23, 2007, the GLLA proposal for clean up was rejected due to unrelated contingencies that had been added to the project proposal by a local stakeholder. However, the data collected and alternatives developed as part of the GLLA project were used by the USEPA Superfund Program to formulate what became the signed agreement for dredging Waukegan Harbor.

USEPA issued a cleanup decision (Record of Decision (ROD) Amendment) on October 30, 2009 (see page 6). The proposal called for dredging the harbor sediment at a target cleanup level of 1 ppm. The sediment was to be placed in an on-site consolidation facility constructed for this purpose on the former OMC Plant 2 site. A thin residual mixing layer of clean sand would be placed in the harbor once dredging was completed to achieve a surface-weighted average concentration of 0.20-0.25 ppm PCBs in the sediment.

Dredging took place in the Entrance Channel and other harbor segments that comprise the Inner Harbor. The Outer Harbor was not part of the Superfund dredge. Environmental dredging was conducted in all areas of the Inner Harbor where sediments exceeded 1ppm PCB concentration, except in areas which were too close to the harbor seawalls to safely dredge. Areas of contamination near the seawalls are being capped. Navigational dredging was then performed, predominantly in the Federal Navigational Channel, to achieve desired channel depth in the harbor (Figures 4 and 5).

The first season of harbor sediment dredging began on September 26, 2012, and continued until November 10, 2012 when the work was halted due to winter conditions. The second and final dredging season began on April 1, 2013. Environmental dredging was completed on July 8th, 2013. The dredged sediment was pumped out of the harbor and over to the former OMC Plant 2 site for processing and placement in an 8-acre consolidation facility located at the north end of the site.

Navigational dredging of the harbor, utilizing Great Lakes National Program Office (GLNPO) funding on USEPA's Superfund contract, was initiated on July 8, 2013. The objective of the navigational dredging was to dredge to a depth of 18 feet in the Navigational Channel portion of the Entrance Channel and

Inner Harbor areas. Sediments from the navigational dredging were also disposed in the consolidation facility.

The environmental and navigational dredging resulted in removal of 124,244 cubic yards (cy) of sediment. Removal of 114,509 cy was funded by the Superfund program, while the removal of the remaining 9,735 cy was funded by GLNPO from the Great Lakes Restoration Initiative (GLRI) funds.

Due to the low levels of residual PCBs in the harbor after dredging was completed, planned placement of a clean sand mixing layer was not necessary, except in areas near the seawalls with residual PCB contamination below 1 ppm where no dredging was performed. A cap was placed over areas of contaminated sediment above 1 ppm for PCBs located too close to the harbor seawall for safe dredging. The North Marina, which was partially removed for dredging, is being reconstructed into a smaller marina, per agreement with the Waukegan Port Authority. In 2014, the treatment plant and other dredging related equipment will be removed from the site, and the consolidation facility will be capped (USEPA 2013).

Additional dredging by the USACE is scheduled for Spring, 2014. This will include 100,000 cubic yards to be removed from the Outer Harbor for beneficial reuse on the upland area of the OMC Coke Plant site. The USACE will also dredge 75,000- 150,000 cubic yards of sediment from the Approach Channel and Advanced Maintenance Area. The clean sand coming from that operation is planned for beneficial reuse as beach renourishment at Illinois Beach State Park and other potential sites. (USACE, personal communication). Neither of these dredging projects is required as part of Superfund or as a remedial action for the Beneficial Use Impairment. However, they benefit Waukegan Harbor and its many uses, and represent the continued investment in interest in the site. These actions are included in this document because they are closely related and further support removal of the Beneficial Use Impairment and allow for continued deep draft use of the harbor.

### **Pre and Post Dredging Contaminant Data**

A pre-dredging survey was performed by J.F. Brennan Co (Brennan) to identify contaminated sediment volumes and dredging locations in Waukegan Harbor (Figure 4). The Harbor was subdivided into dredge management units (DMUs) for cleanup management purposes. For each DMU, composite samples of sediments were collected and analyzed after dredging to determine surface-weighted average concentrations (SWAC) of PCBs to ensure the units have met the clean up goal of not greater than 1ppm for PCBs before moving to the next area. Post-dredging analysis is shown in Figure 5 and Table 1, with the results presented for the Navigational Channel segment and the Non-Navigational Channel segment, and further subdivided into Dredge Management Units (DMUs).

The representative concentrations for DMUs in the Non-Navigational segments are based on the total PCB concentrations in the sample created from compositing the 0- to 1-foot interval below the post-dredge surface from the five locations within the DMU. The representative concentrations for DMUs in the navigational segments are based on the total PCB concentrations in the sample created from compositing the 0- to 2-foot interval below the post-dredge surface from the five locations within the DMU. Table 1 provides surface-weighted average concentrations for each DMU.

## Conclusions and Recommendations

Samples collected and analyzed post-dredging demonstrate the surface-weighted average concentrations (SWACs) of PCB in Waukegan Harbor are below the target concentration of 0.2ppm decided upon in the 2009 Record of Decision Amendment. Concentrations of PCBs in individual dredge management units were all below 0.2ppm. Within the segments that comprise the broad category of the Inner Harbor (as shown in Figure 1), the SWAC ranged from 0.0171 ppm to 0.0485 ppm for environmental dredging and 0.0171 ppm to 0.0520 ppm for navigational dredging. For the Outer Harbor (which was not part of this remedial action), previous investigations demonstrated a SWAC of 0.13 ppm PCB. The overall harbor SWAC (Inner and Outer Harbor) following environmental dredging equaled 0.0604 ppm PCB. After navigational dredging, the overall harbor SWAC equaled 0.0607 ppm PCB.

In consideration of the actions that have been completed and the strength of the supporting data that demonstrates the PCB levels are within the required limits, IDNR, with the support of the Waukegan Harbor CAG, recommends the removal of the dredging BUI.



Figure 4. Pre-dredging survey in Waukegan Harbor.

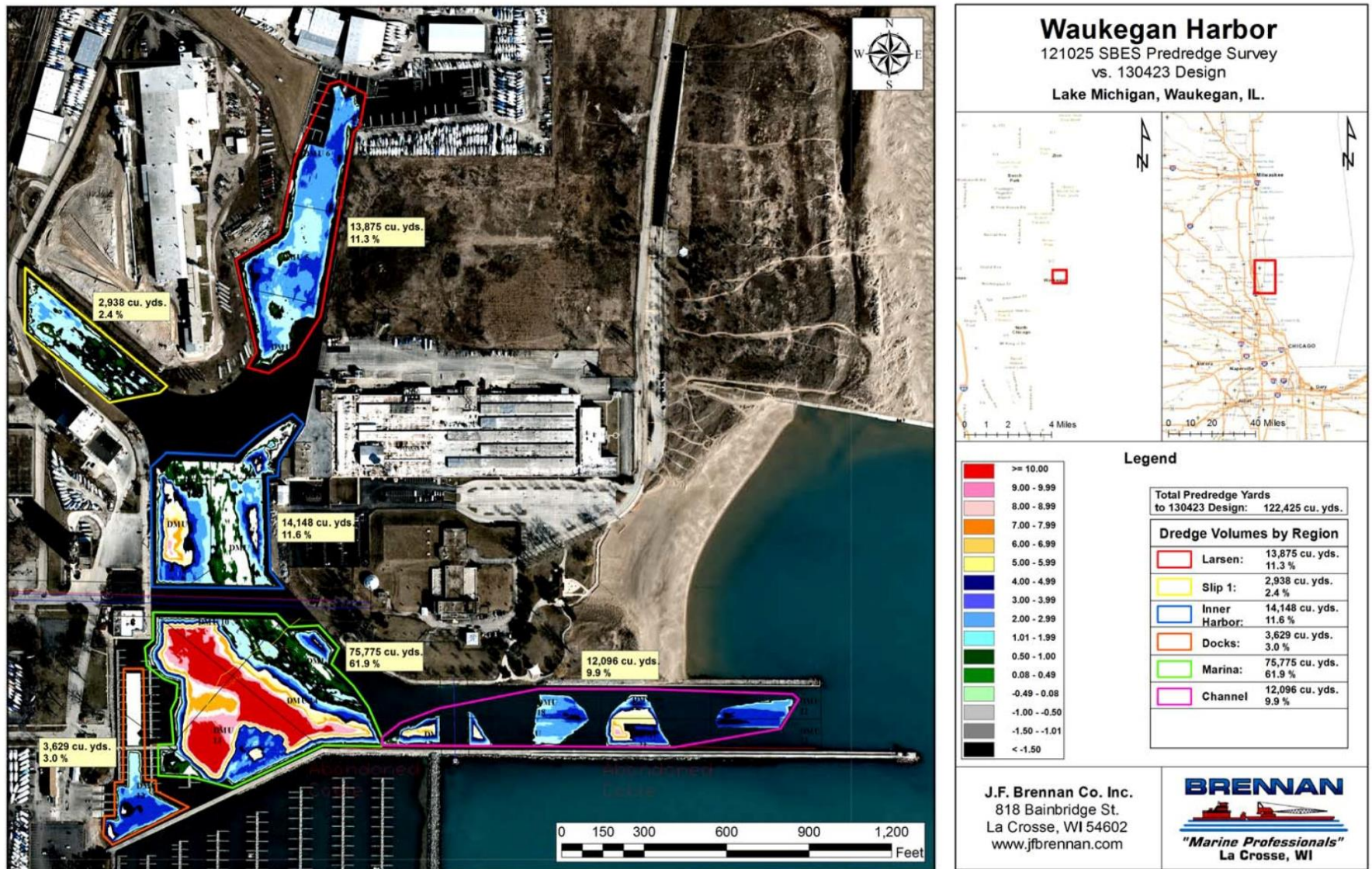




Figure 5. Post navigational dredge surface-weighted average concentrations (SWACs) of PCBs.

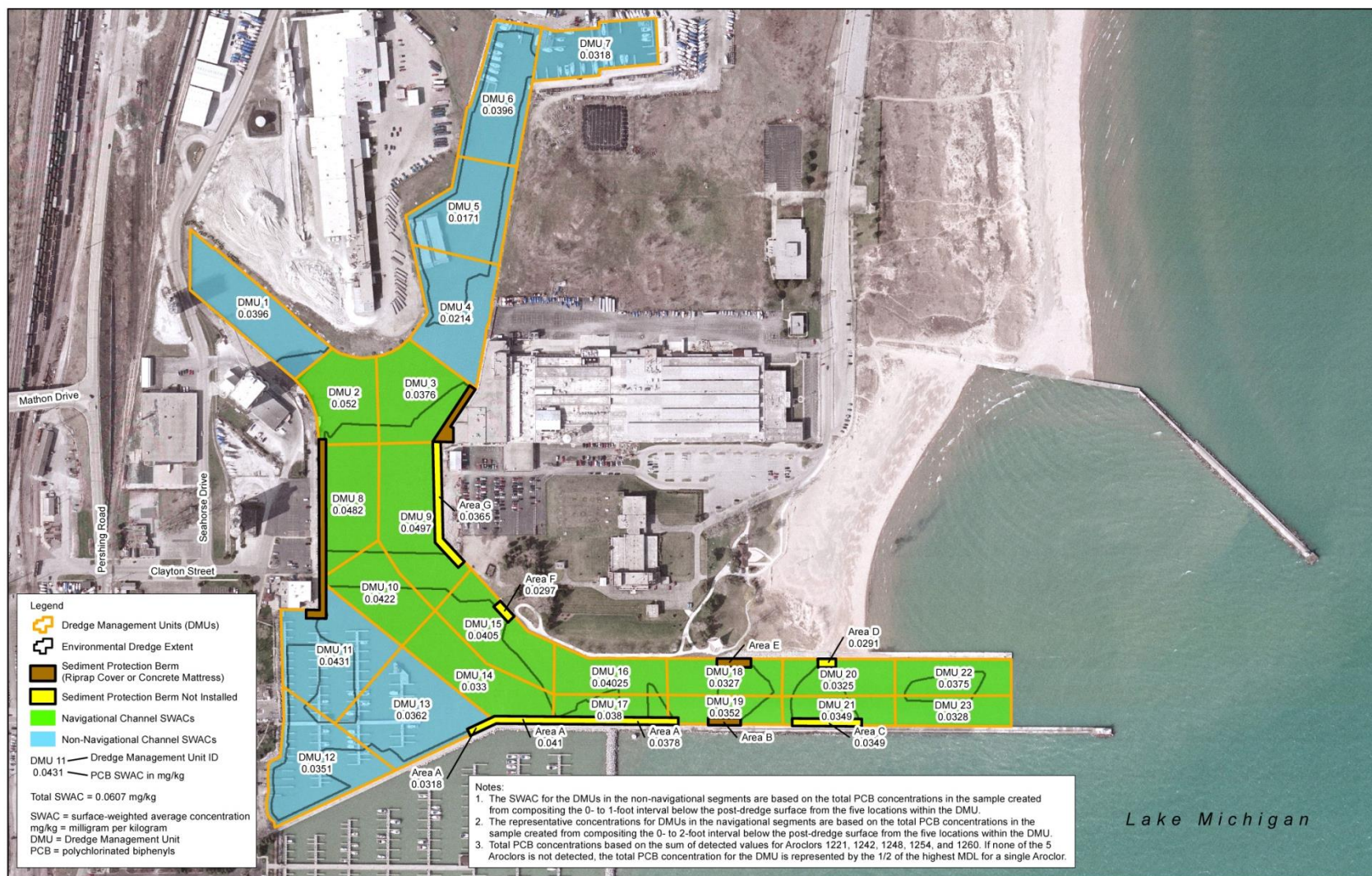


Figure 1  
Post-Navigational Dredge SWACs  
Waukegan Harbor Area of Concern  
Waukegan, Illinois

CH2MHILL

E:\EPA\182500\_VAUKEGAN\_HARBOR\GIS\_DATA\MXD\92012\HUCKRADDEMANN\_011413\FIGURE 01 - POST-NAVIGATIONAL DREDGE SWACs.MXD JHANSEN1 10/7/2013 10:41:33 AM

**Table 1: Summary of post-dredge PCB surface-weighted average concentrations (SWACs) in Waukegan Harbor dredge management units (DMUs)**

			DMU	DMU Area (ft <sup>2</sup> )	Post-Environmental Dredge				Post-Navigational Dredge				
					Total PCB Concentration <sup>3</sup> (mg/kg)	Adjusted Total PCB Concentration <sup>4</sup> (mg/kg)	DMU Area x Adjusted PCB Concentration (ft <sup>2</sup> - mg/kg)	Estimated SWAC <sup>5</sup> (mg/kg)	Total PCB Concentration <sup>3</sup> (mg/kg)	Adjusted Total PCB Concentration <sup>4</sup> (mg/kg)	DMU Area x Adjusted PCB Concentration (ft <sup>2</sup> - mg/kg)	Estimated SWAC <sup>5</sup> (mg/kg)	
Harbor Segments		DMU											
Non-Navigational Channel Segments <sup>1</sup>	Slip 4	7	67149	0.0635 U	0.0318	2135	0.0318	0.0635 U <sup>6</sup>	0.0318	2135	0.0318		
	North Harbor	4	98067	0.0428 U	0.0214	2099	0.0214	0.0428 U <sup>6</sup>	0.0214	2099	0.0214		
		5	92508	0.0341 U	0.0171	1582	0.0171	0.0341 U <sup>6</sup>	0.0171	1582	0.0171		
		6	99342	0.0792 U	0.0396	3934	0.0396	0.0792 U <sup>6</sup>	0.0396	3934	0.0396		
		Slip 1	1	94892	0.0791 U	0.0396	3758	0.0396	0.0791 U <sup>6</sup>	0.0396	3758	0.0396	
	Marina	11	119260	0.0861 U	0.0431	5140	0.0431	0.0861 U <sup>6</sup>	0.0431	5140	0.0431		
		12	115384	0.0702 U	0.0351	4050	0.0351	0.0702 U <sup>6</sup>	0.0351	4050	0.0351		
13		116697	0.0724 U	0.0362	4224	0.0362	0.0724 U <sup>6</sup>	0.0362	4224	0.0362			
Navigational Channel Segments <sup>2</sup>	Inner Harbor	2	73075	0.0889 U	0.0445	3252	0.0445	0.1040 U	0.0520	3800	0.0520		
	Extension	3	90848	0.0751 U	0.0376	3416	0.0376	0.0751 U <sup>6</sup>	0.0376	3416	0.0376		
	Inner Harbor	8	87288	0.0963 U	0.0482	4207	0.0482	0.0963 U <sup>6</sup>	0.0482	4207	0.0482		
		9	114843	0.0969 U	0.0485	5570	0.0485	0.0993 U	0.0497	5708	0.0497		
		10	74324	0.0843 U	0.0422	3136	0.0422	0.0843 U <sup>6</sup>	0.0422	3136	0.0422		
		14	94868	0.0660 U	0.0330	3131	0.0330	0.0660 U <sup>6</sup>	0.0330	3131	0.0330		
		15	73872	0.0810 U	0.0405	2992	0.0405	0.0810 U <sup>6</sup>	0.0405	2992	0.0405		
	Entrance Channel	16	49333	0.0805 U	0.0403	1988	0.0403	0.0805 U <sup>6</sup>	0.0403	1988	0.0403		
		17	46639	0.0759 U	0.0380	1772	0.0380	0.0759 U <sup>6</sup>	0.0380	1772	0.0380		
		18	47122	0.0746 U	0.0373	1758	0.0373	0.0653 U	0.0327	1541	0.0327		
		19	46868	0.0704 U	0.0352	1650	0.0352	0.0704 U	0.0352	1650	0.0352		
		20	46810	0.0622 U	0.0311	1456	0.0311	0.0649 U	0.0325	1521	0.0325		
		21	46786	0.0687 U	0.0344	1609	0.0344	0.0698 U	0.0349	1633	0.0349		
		22	47190	0.0674 U	0.0337	1590	0.0337	0.0750 U	0.0375	1770	0.0375		
		23	47549	0.0670 U	0.0335	1593	0.0335	0.0656 U	0.0328	1560	0.0328		
Outer Harbor <sup>7</sup>	--	605704		0.13 <sup>8</sup>	78742	0.13		0.13 <sup>8</sup>	78742	0.13			
	Total Area =		2396418			Overall Harbor SWAC =		0.0604			Overall Harbor SWAC =		0.0607

**Notes:** ft<sup>2</sup> = square feet; SWAC = surface-weighted average concentration; mg/kg = milligram per kilogram ; DMU = Dredge Management Unit ; PCB = polychlorinated biphenyls ; U = not detected above method detection limit (MDL)

<sup>1</sup> The representative concentrations for DMUs in the non-navigational segments are based on the total PCB concentrations in the sample created from compositing the 0- to 1-foot interval below the post-dredge surface from the five locations within the DMU.

<sup>2</sup> The representative concentrations for DMUs in the navigational segments are based on the total PCB concentrations in the sample created from compositing the 0- to 2-foot interval below the post-dredge surface from the five locations within the DMU.

<sup>3</sup> Total PCB concentrations based on the sum of detected values for Aroclors 1221, 1242, 1248, 1254, and 1260. If none of the 5 Aroclors is not detected, the total PCB concentration for the DMU is represented by the the highest MDL for a single Aroclor.

<sup>4</sup> If none of the 5 Aroclors were detected, the total PCB concentration used in the SWAC calculation was adjusted to 1/2 of the highest MDL for a single Aroclor.

<sup>5</sup> Surface-weighted average concentration (SWAC) for each DMU is calculated using the following formula:

$$\text{SWAC (mg/kg)} = \frac{\sum [\text{DMU Area (ft}^2\text{)} \times \text{Adjusted Total PCB Concentration (mg/kg)}]}{\sum \text{DMU Area (ft}^2\text{)}}$$

<sup>6</sup> Additional naviagtional dredging not impact surface conditions in these DMUs. Post-environmental and post-navigational surface concentrations the same.

<sup>7</sup> Remediation of Outer Harbor is not required and, therefore not part of the remedial action

<sup>8</sup> Total PCB concentration for Outer Harbor Segment is based on previous investigations

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