Clean Water Act 404(b)1
Contaminant Determination Report
Waukegan Outer Harbor
Waukegan Harbor, Waukegan, Illinois

United States Army Corps of Engineers
Chicago District
231 South LaSalle Street
Chicago, Illinois 60604

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Contents

1. Introduction

This report documents the collection, analysis, and results of August 2016 sediment sampling conducted in support of proposed dredging of the Waukegan Outer Harbor and also serves as a contaminant determination report for the same area. The sampling and subsequent chemical and physical evaluation was completed in order to determine the acceptability of future dredging in Waukegan Outer Harbor, adjacent to the Waukegan Harbor Approach Channel which is regularly dredged under Water Quality Certification C-0280-14.

Waukegan Harbor is located in Waukegan, Lake County, Illinois, approximately 40 miles north of downtown Chicago. It lies several miles south of the Illinois/Wisconsin border on the shoreline of Lake Michigan. **Figure 1** shows the location of Waukegan Harbor in reference to the city of Chicago. The federally authorized navigational facility consists of an Approach Channel, an outer harbor, an entrance channel, and an inner harbor. There are also privately owned and maintained slips and an extension to the inner harbor, which is federally authorized though not maintained. Waukegan Harbor is used for both recreational and industrial activities. The USACE Chicago District is responsible for maintenance dredging within the federal navigation channel of Waukegan Harbor. **Figure 2** shows an aerial view of the harbor with the Approach Channel and Outer Harbor highlighted.

Figure 1: Waukegan Harbor

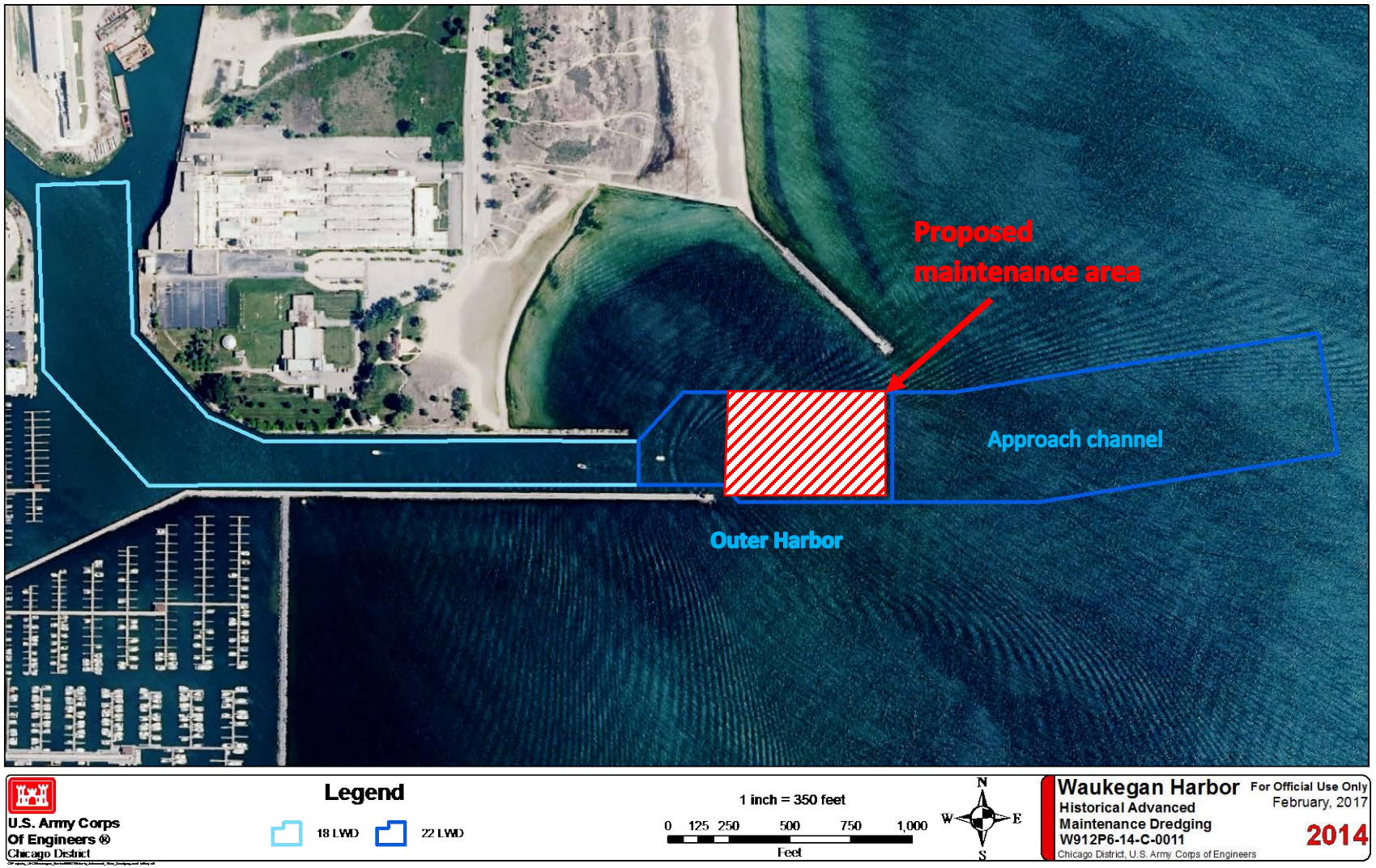

Figure 2: Harbor elements

1.1. Purpose of Report

The Waukegan Outer Harbor is experiencing shoaling and it is anticipated that within a year it must be dredged in order to prevent potential navigational and safety impacts. Consistent with the current practice, the Illinois coastal management program, and the existing 401 water quality certification for the Approach Channel, the dredged sediment would be placed in the littoral zone south of the harbor, or possibly placed in the littoral zone north by Illinois Beach State Park. In order to document the acceptability of dredging activities and subsequent placement of the dredged material, sediment and water samples were collected at the Outer Harbor. The sediment and elutriate (supernatant) were analyzed consistent with the existing 401 water quality certification for the Approach Channel and advance maintenance area.

This report documents the results of the analyses performed from the Outer Harbor samples and compares them to Illinois regulations and historical data from both the Outer Harbor and Approach Channel. Sediment that is consistent in quality with the historical range of Approach Channel sediment conditions is assumed to be acceptable for similar dredging and disposal operations.

2. Project Overview

Waukegan Harbor is a man-made harbor, constructed in 1880, that has been expanded and modified over the years. In the past, there have been multiple privately owned and maintained slips; most notably, “Slip No. 3” was filled in the 1990s with PCB contaminated sediment. Though Waukegan Harbor is utilized by both recreational users and industries, land use in the past has been predominantly industrial. Since the late 1800s, the following industries have been documented within one mile of the harbor: steel processing; paint and dye; foundry work; coking operations; manufacturing of construction materials including wallboard, insulation, and concrete products; wastewater and water treatment; and marine motor and vessel construction. USACE has routinely dredged the Approach Channel and an adjacent advance maintenance area since 1996, with dredging occurring on a nearly annual basis. The outer harbor was dredged most recently in 2015. The entrance channel and inner harbor are not regularly maintained.

2.1. Shoaling Pattern

The littoral drift pattern in the vicinity of Waukegan Harbor is predominately from north to south, with the overall net transport rate (from the Wisconsin state line to Chicago) of approximately 80,000 cubic yards per year. The dredged Outer Harbor and Approach Channel act as sinks, where the littoral sediment settles, thus significantly reducing the amount of littoral sediment migrating south of this location. In the past, accretion has largely occurred in the Approach Channel. The Outer Harbor typically only experiences minor shoaling and, until recently, had not been dredged since the 1970s. Throughout the 1970s, the pattern of shoaling was along the eastern edge of the Outer Harbor and into the Approach Channel.

It is typically assumed that an annual average shoaling rate can be estimated based on dredged volumes and time span between dredging activities. On average, USACE has dredged at an average rate of 41,000 cubic yards per year in the Waukegan Harbor area. Over the past several years, however, the updrift fillet beach and bypass shoal have reached their maximum capacity and are no longer providing significant sediment storage. As a result, the incoming sediment load approaching the Federal channel has increased to an estimated 71,000 cubic yards per year, which has led to a significant increase in shoaling within the Approach Channel and surrounding areas. This increase in shoaling and sediment accretion has resulted in the need for dredging; in the year since the outer harbor was dredged, sediment has begun to accumulate in the eastern edge of the Outer Harbor and threatens to pose a risk to navigation and safety. Figures 3 and 4 below illustrate the sediment accretion that has occurred between the October 2015, directly after a dredging event (Figure 3) and the April 2016 (Figure 4). The orange depicted in Figure 4 clearly shows the increase of sediment in the Outer Harbor within approximately seven months; it is anticipated that this shoal will continue to expand.

Figure 5 shows historical dredging areas, from 1977. At this time, both the Outer Harbor and Approach Channel were being regularly dredged to remove shoaled sediment. The areas colored in red on the harbor map show the shoaled locations that were dredged in 1977. The shoaling patterns remain the same along the Illinois coast near Waukegan Harbor, with no new piers or other major changes that would change erosion and deposition patterns. It is anticipated that the areas shown will also require dredging in the near future, as the historical shoaling pattern re-establishes within the navigation channel. A return to the historical shoaling pattern will necessitate a return to regular dredging in the Outer Harbor. It is anticipated that the total volume of shoaled material will not change (up to 80,000 CY per year), but that the material will be redistributed within the larger area.

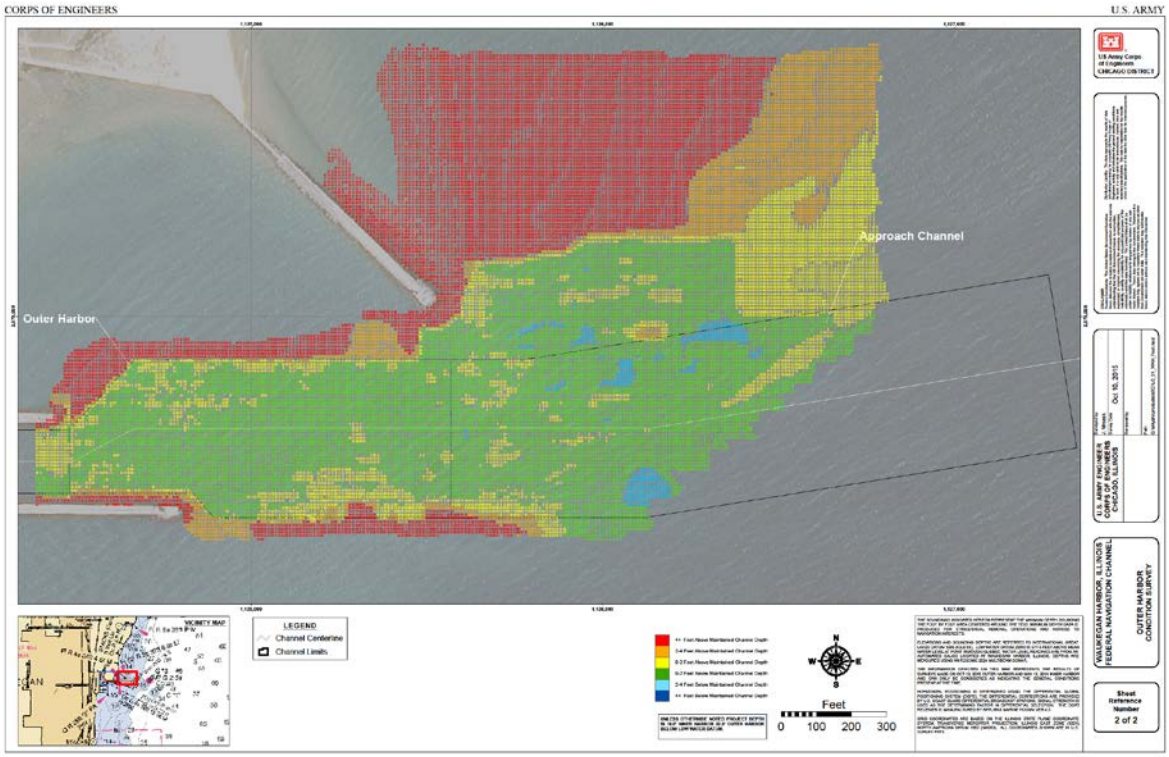

Figure 3: Waukegan Outer Harbor after October 2015 Dredging Event

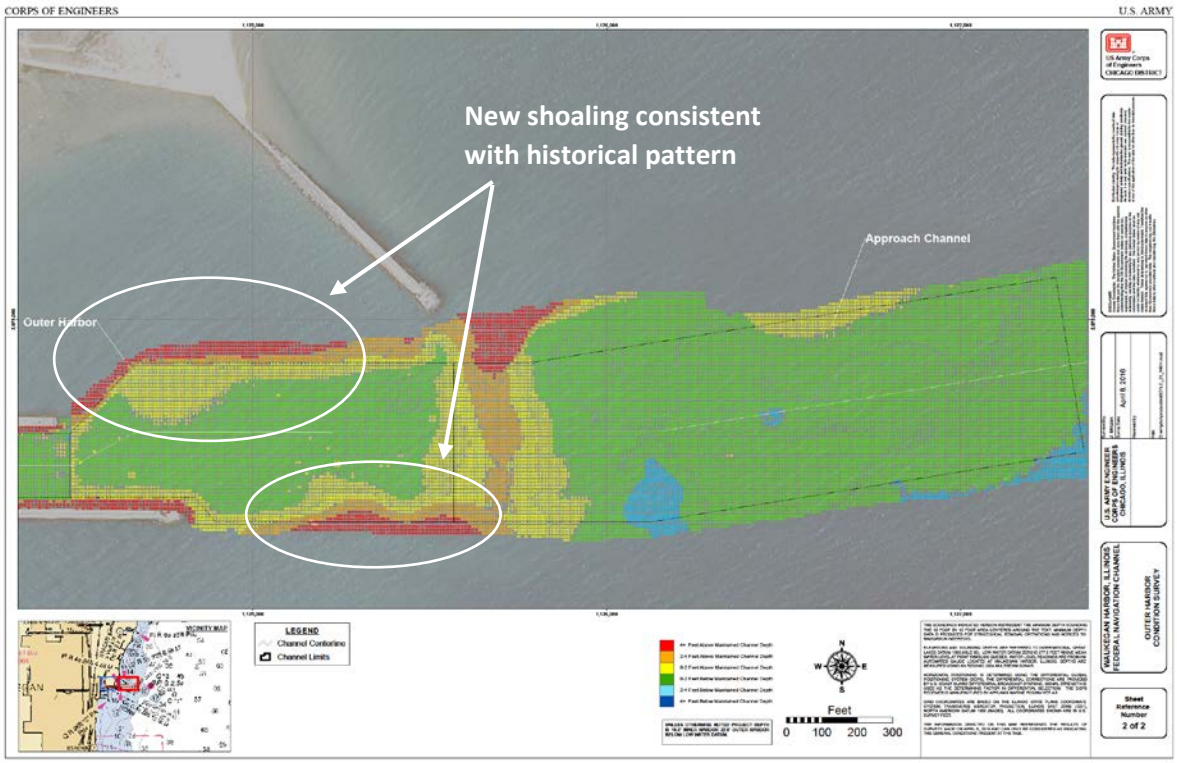

Figure 4: Waukegan Outer Harbor April 2016

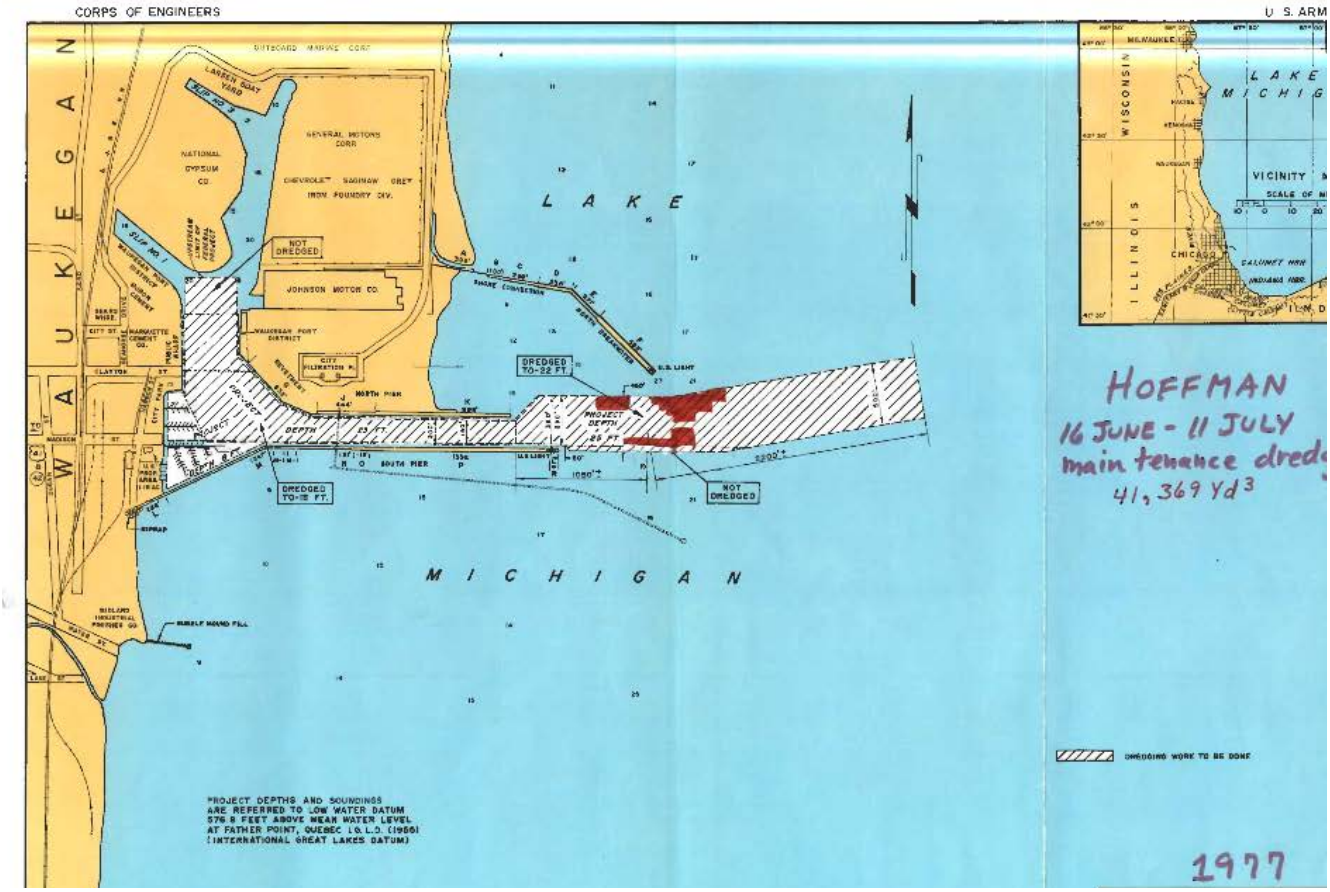

Figure 5: Historical dredging: 1977 Outer Harbor/Approach Channel Dredging

2.2. Potential Sources of Contamination

There are few potential sources of contamination in the Waukegan Outer Harbor, since the shoaled sediment originates in the open lake. As such, the data presented are an accurate illustration of the levels of contamination in the sediment of the Waukegan Outer Harbor. The Approach Channel has historically been clean, coarse sand, free of asbestos and PCBs, and considered suitable for open water (littoral zone) placement. The Outer Harbor is directly adjacent to the Approach Channel and since it was dredged is now trapping the same sediment accumulates within the Approach Channel. As there are no potential upland sources of contamination in the Approach Channel, and the Approach Channel and the Outer Harbor contain sediment of the same origin, there are no potential upland sources of contamination for the Outer Harbor.

2.3. Historical Asbestos Sources

Less than 2 miles north of Waukegan Harbor, and along the coast, the Johns Manville Corporation had a manufacturing plant which produced asbestos containing products during the 20th century. The 150 acre site ceased operations in 1998 and has been since demolished. Clean up activities are on-going. It is suspected that over the years, some asbestos containing insulation and/or building materials were placed in the lake. The presence of building materials containing asbestos on the public beach has been documented at Illinois Beach State Park, which is located north of Waukegan Harbor. Due to public concern with the issue and the known health implications associated with asbestos inhalation, the Illinois Environmental Protection Agency (IEPA) requires all coastal projects to complete extensive sampling and analysis using a specific method, to ensure that asbestos is not present in the sediment being disturbed. USACE completed that work in 2006, including a human health risk assessment. The 2006 sampling consisted of 12 sediment cores taken in the outer harbor. All twelve cores were analyzed using the "Elutriator" method for trace asbestos detection, as well as for grain size. The human health risk assessment was conducted assuming that the Waukegan Outer Harbor sediment would be used in an unconfined residential setting. The incremental cancer risk was calculated to be 4E-08, well below the acceptable risk limit of 1E-06. The very low amount of asbestos in the dredged material does not pose an unacceptable risk to human health. It is not proposed to use any future Outer Harbor dredged sediment as upland fill material, since the Illinois coastal management program requires that clean littoral material be kept within the littoral zone. Thus, the risk to humans for contact would only potentially occur in a recreational setting, such as a beach, where the exposure would be even less than previously calculated.

The Manville superfund site is in the last stages of closure and restoration. The future land use is presumed to be "greenspace" and there is no definitive plan publicized for the use of the space. The site is no longer a source of asbestos. Because Outer Harbor sediment results have been very low and because there is no longer a source updrift of the harbor, asbestos was not measured in the Outer Harbor.

2.4. Historical PCB Sources

Discharges from the Outboard Marine Corporation into the harbor in the 1980's led to the placement of the Inner Harbor on the National Priority List in 1983. Sediment contaminated with very high PCB concentrations was removed from the harbor in the 1990's and placed within a former industrial slip in the harbor, which was enclosed and capped. Elevated fish tissue PCB concentrations at Waukegan Harbor were attributed to the residual low PCB concentrations in the Inner Harbor sediment. In 2013, USEPA conducted a dredging event to remove all sediment with a surface concentration greater than 0.25 mg/Kg. The sediment was disposed of in an upland containment cell.

During the time that the Inner Harbor sediment was contaminated with PCBs, deep draft navigation continued at the harbor. There was concern that PCBs from the Inner

Harbor would migrate or be washed or dragged through the entrance channel and into the Outer Harbor. Several sampling events performed by USACE and USEPA in 1995 through 2005 confirmed that PCBs were not moving out of the Inner Harbor. Extensive sampling in 2006 and 2012 in the Outer Harbor found no measurable PCBs in the elutriate samples. Because the upland source has been removed and the contaminated sediment in the Inner Harbor has also been removed, there is no source of PCBs for the Outer Harbor.

3. Analytical results

Sediment grab samples were collected in the Waukegan Outer Harbor in August 2016. Three grab samples were collected from the most shoaled areas. At the time of sampling, sediment has not accumulated throughout the entire Outer Harbor, so the sediment samples could not be better distributed throughout the area. The sediment collected does represent the material that had accumulated, since the samples were collected within the shoaled areas. One elutriate (supernatant) was prepared for each sediment sample, with a settling time of four hours. Lake Michigan water was used to prepare the elutriate samples and was also analyzed.

Figure 6: Outer Harbor Sampling Locations and Proposed Dredging Area

The elutriate (supernatant) samples were tested for Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Sulfate, Chloride, Phosphorus, Ammonia, hardness, temperature, and pH. This limited list was used as the basis for evaluation consistent with the Water Quality Certification C-0280-14 for the Approach Channel. As discussed above, there are no sources of asbestos or PCBs for the Outer Harbor, and historically the littoral sediment has been free from metals and anthropogenic compounds that would warrant further evaluation. Sediment samples from the Outer Harbor were tested for their percentage of fines, which is equivalent to the amount of the sediment that passes through a #230 sieve. The data are summarized in Table 1. Analytical results for the Outer Harbor can be found Appendix A.

Historical data were reviewed and compared to the data obtained during the August 2016 sediment sampling event to ensure that the sediment from the Outer Harbor falls within the historical range and is thus suitable for dredging and placement in the littoral zone south of the harbor. The sediment now shoaling in the Outer Harbor is coarser than the material dredged in 2015 and placed upland, and the newly sampled material is consistent with the sediment found in the Approach Channel. Fines were very low, and much less than 20% passing the #230 sieve.

A four hour settling time was used for elutriate (supernatant) analyses. A separate analysis was done for each sediment sample. All of the water quality parameters which have historically been of interest for the Approach Channel, including ammonia, suspended solids, phosphate, chloride, and sulfate, are less than the historical maximum value measured for the Approach Channel. Because sediment from the Approach Channel, including materials giving the historical maximum concentrations found in the elutriate measurements, has not caused measurable water quality or wildlife impacts, the material sampled in the Outer Harbor also should not cause impacts.
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Table 1: 2016 Outer Harbor Data

Parameter	Material Tested	2016 Outer Harbor			Lake Michigan 2016	2012 Outer Harbor	Historical Approach Channel Maximum
		G01	G02	G03			
TSS (mg/L)	Supernatant (Elutriate, 4-hour Settling Time)	130	130	830	8.9	248	2160
TDS (mg/L)	Supernatant	230	200	210	140	1070	280
Sulfate (mg/L)	Supernatant	22	21	23	23	22	34.2
Chloride (mg/L)	Supernatant	9.5	9.5	9.4	12	11.6	28.7
Phosphorus (mg/L)	Supernatant	0.26	0.11	0.3	0.0095	0.305	0.36
Ammonia (mg/L)	Supernatant	3	0.16	0.21	<0.02	4.82	3.13
Hardness (mg/L)	Supernatant	160	170	520	130	181	NA
Temperature (F)	Supernatant	74.7	75.3	74.9	78.2	NA	NA
pH (pH units)	Supernatant	8.03	8.10	8.09	8.12	8.24	NA
Percent passing #230	Sediment	7.5	3.2	1.9	NA	1.0 - 89	NA

NA = not applicable

4. Conclusions

Shoaling has begun to accumulate in the Waukegan Outer Harbor, which was dredged in 2015. In preparation for future dredging activities, the sediment in the newly formed shoals was evaluated consistent with the conditions in Water Quality Certification C-0280-14, which is for routine navigational maintenance dredging in the adjacent Approach Channel. Because the newly shoaled sediment originates from the same sources as the material dredged from the Approach Channel, and because the sediment and elutriate meet the conditions stated in C-0280-14, the sediment is considered to be suitable for open water placement in Lake Michigan.

The Federal Standard for Waukegan Outer Harbor is determined to be open water placement (including near shore or deep water placement). Consistent with the Illinois coastal management plan and with current practice, it is proposed that any sediment dredged from the Outer Harbor would be placed south of the harbor in the littoral zone or, dependent on funding, north in the littoral zone along Illinois Beach State Park. The base plan for Waukegan Outer Harbor is mechanical dredging, with near shore placement via bottom dump (split hull) scow, at the south placement area already in use for the Waukegan Approach Channel materials.

5. References

Illinois EPA, Water Quality Certification C-0280-14.

USACE. May 2014. Contaminant Determination Report For Waukegan Outer Harbor, Waukegan Illinois.

USACE. May 2014. Contaminant Determination: Approach Channel and Advanced Maintenance Area, Waukegan Harbor, Waukegan Illinois.

USEPA, and USACE. 1998a. “Evaluation of Dredged Material Proposed For Discharge in Waters of the U.S. – Testing Manual, ‘Inland Testing Manual’.” EPA-823-B-98-004. U.S. Environmental Protection Agency, U.S. Army Corps of Engineers.

-------.1998b. “Great Lakes Dredged Material Testing and Evaluation Manual.” U.S. Environmental Protection Agency, U.S. Army Corps of Engineers.

Appendix A: Analytical Results

Client Sample Results

Client: Quality Environmental Professionals, Inc
Project/Site: Waukegan Sediments

TestAmerica Job ID: 180-57561-1

Client Sample ID: WOH16-G02 4 HOURS
Lab Sample ID: 180-57561-8
Date Collected: 08/30/16 13:30
Matrix: Illinois Supernatant
Date Received: 08/12/16 17:58

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field Temperature	17.8				Centigrade			08/30/16 13:30	1

Client Sample ID: WOH16-G03 4 HOURS
Lab Sample ID: 180-57561-11
Date Collected: 08/11/16 09:30
Matrix: Sediment
Date Received: 08/12/16 17:58

Method: 35 ILL C-395 - Illinois Supernatant Test - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Elutriate Generated	20				%			08/30/16 09:35	1

Client Sample ID: WOH16-G03 4 HOURS
Lab Sample ID: 180-57561-12
Date Collected: 08/30/16 13:35
Matrix: Illinois Supernatant
Date Received: 08/12/16 17:58

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.4		1.0	0.33	mg/L			09/07/16 14:21	1
Sulfate	23		1.0	0.34	mg/L			09/07/16 14:21	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	210		10	10	mg/L			08/31/16 13:42	1
Ammonia	0.21		0.020	0.0090	mg/L			08/31/16 15:40	1
pH	8.0	HF	0.1	0.1	SU			09/01/16 12:47	1
Hardness as calcium carbonate	520		25	25	mg/L			09/02/16 10:53	1
Total Suspended Solids	830		5.0	5.0	mg/L			08/31/16 16:47	1
Phosphorus	0.30		0.010	0.0050	mg/L			09/01/16 00:15	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field Temperature	17.7				Centigrade			08/30/16 13:35	1

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Elutriate Generated	20				%			08/30/16 09:30	1

Client Sample ID: WOH16-G02 4 HOURS
Lab Sample ID: 180-57561-8
Date Collected: 08/30/16 13:30
Matrix: Illinois Supernatant
Date Received: 08/12/16 17:58

Method: 300.0-1993 R2.1 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	9.5		1.0	0.33	mg/L			09/07/16 13:33	1
Sulfate	21		1.0	0.34	mg/L			09/07/16 13:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	200		10	10	mg/L			08/31/16 13:42	1
Ammonia	0.16		0.020	0.0090	mg/L			08/31/16 15:39	1
pH	8.1	HF	0.1	0.1	SU			09/01/16 12:50	1
Hardness as calcium carbonate	170		5.0	5.0	mg/L			09/02/16 10:46	1
Total Suspended Solids	130		2.0	2.0	mg/L			08/31/16 16:47	1
Phosphorus	0.11		0.010	0.0050	mg/L			09/01/16 00:15	1

Client Sample ID: WOH16-G01 — **Lab Sample ID: 180-60622-35**
Date Collected: 08/11/16 08:15 — Matrix: Sediment
Date Received: 11/09/16 14:09

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	0.0				%			11/30/16 17:37	1
Sieve Size 2 Inch - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Sand	92.5				%			11/30/16 17:37	1
Sieve Size 1.5 Inch - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Coarse Sand	0.5				%			11/30/16 17:37	1
Sieve Size 1 Inch - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Medium Sand	0.5				%			11/30/16 17:37	1
Sieve Size 0.75 Inch - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Fine Sand	91.5				%			11/30/16 17:37	1
Sieve Size 0.375 Inch - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Sieve Size #4 - Percent Finer	100.0				% Passing			11/30/16 17:37	1
Silt	5.8				%			11/30/16 17:37	1
Clay	1.7				%			11/30/16 17:37	1

Client Sample ID: WOH16-G01 — **Lab Sample ID: 180-60622-35**
Date Collected: 08/11/16 08:15 — Matrix: Sediment
Date Received: 11/09/16 14:09

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sieve Size #10 - Percent Finer	99.5				% Passing			11/30/16 17:37	1
Sieve Size #20 - Percent Finer	99.3				% Passing			11/30/16 17:37	1
Sieve Size #40 - Percent Finer	99.0				% Passing			11/30/16 17:37	1
Sieve Size #60 - Percent Finer	94.7				% Passing			11/30/16 17:37	1
Sieve Size #80 - Percent Finer	71.8				% Passing			11/30/16 17:37	1
Sieve Size #100 - Percent Finer	43.7				% Passing			11/30/16 17:37	1
Sieve Size #200 - Percent Finer	8.6				% Passing			11/30/16 17:37	1
Sieve Size #230 - Percent Finer	7.5				% Passing			11/30/16 17:37	1
Hydrometer Reading 1 - Percent Finer	4.9				% Passing			11/30/16 17:37	1
Hydrometer Reading 2 - Percent Finer	3.3				% Passing			11/30/16 17:37	1
Hydrometer Reading 3 - Percent Finer	2.2				% Passing			11/30/16 17:37	1
Hydrometer Reading 4 - Percent Finer	1.7				% Passing			11/30/16 17:37	1
Hydrometer Reading 5 - Percent Finer	1.7				% Passing			11/30/16 17:37	1
Hydrometer Reading 6 - Percent Finer	1.1				% Passing			11/30/16 17:37	1
Hydrometer Reading 7 - Percent Finer	0.5				% Passing			11/30/16 17:37	1

Client Sample ID: WOH16-G02 — **Lab Sample ID: 180-60622-36**
Date Collected: 08/11/16 08:51 — Matrix: Sediment
Date Received: 11/09/16 14:09

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	0.0				%			11/30/16 17:39	1
Sieve Size 2 Inch - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Sand	96.8				%			11/30/16 17:39	1
Sieve Size 1.5 Inch - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Coarse Sand	0.0				%			11/30/16 17:39	1
Sieve Size 1 Inch - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Medium Sand	1.2				%			11/30/16 17:39	1
Sieve Size 0.75 Inch - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Fine Sand	95.6				%			11/30/16 17:39	1
Sieve Size 0.375 Inch - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Sieve Size #4 - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Silt	2.7				%			11/30/16 17:39	1
Clay	0.5				%			11/30/16 17:39	1
Sieve Size #10 - Percent Finer	100.0				% Passing			11/30/16 17:39	1
Sieve Size #20 - Percent Finer	99.6				% Passing			11/30/16 17:39	1
Sieve Size #40 - Percent Finer	98.8				% Passing			11/30/16 17:39	1
Sieve Size #60 - Percent Finer	83.6				% Passing			11/30/16 17:39	1
Sieve Size #80 - Percent Finer	43.7				% Passing			11/30/16 17:39	1
Sieve Size #100 - Percent Finer	26.1				% Passing			11/30/16 17:39	1
Sieve Size #200 - Percent Finer	3.8				% Passing			11/30/16 17:39	1
Sieve Size #230 - Percent Finer	3.2				% Passing			11/30/16 17:39	1

Client Sample ID: WOH16-G02 — **Lab Sample ID: 180-60622-36**
Date Collected: 08/11/16 08:51 — Matrix: Sediment
Date Received: 11/09/16 14:09

Method: D422 - Grain Size (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hydrometer Reading 1 - Percent Finer	1.4				% Passing			11/30/16 17:39	1
Hydrometer Reading 2 - Percent Finer	1.4				% Passing			11/30/16 17:39	1
Hydrometer Reading 3 - Percent Finer	0.5				% Passing			11/30/16 17:39	1
Hydrometer Reading 4 - Percent Finer	0.5				% Passing			11/30/16 17:39	1
Hydrometer Reading 5 - Percent Finer	0.5				% Passing			11/30/16 17:39	1
Hydrometer Reading 6 - Percent Finer	0.5				% Passing			11/30/16 17:39	1
Hydrometer Reading 7 - Percent Finer	0.5				% Passing			11/30/16 17:39	1

Client Sample ID: WOH16-G03 — **Lab Sample ID: 180-60622-37**
Date Collected: 08/11/16 09:31 — Matrix: Sediment
Date Received: 11/09/16 14:09

Method: D422 - Grain Size

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gravel	0.0				%			11/30/16 17:41	1
Sieve Size 2 Inch - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Sand	98.1				%			11/30/16 17:41	1
Sieve Size 1.5 Inch - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Coarse Sand	0.0				%			11/30/16 17:41	1
Sieve Size 1 Inch - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Medium Sand	0.3				%			11/30/16 17:41	1
Sieve Size 0.75 Inch - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Fine Sand	97.8				%			11/30/16 17:41	1
Sieve Size 0.375 Inch - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Sieve Size #4 - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Silt	1.3				%			11/30/16 17:41	1
Clay	0.6				%			11/30/16 17:41	1
Sieve Size #10 - Percent Finer	100.0				% Passing			11/30/16 17:41	1
Sieve Size #20 - Percent Finer	99.9				% Passing			11/30/16 17:41	1
Sieve Size #40 - Percent Finer	99.7				% Passing			11/30/16 17:41	1
Sieve Size #60 - Percent Finer	92.2				% Passing			11/30/16 17:41	1
Sieve Size #80 - Percent Finer	49.5				% Passing			11/30/16 17:41	1
Sieve Size #100 - Percent Finer	30.8				% Passing			11/30/16 17:41	1
Sieve Size #200 - Percent Finer	2.6				% Passing			11/30/16 17:41	1
Sieve Size #230 - Percent Finer	1.9				% Passing			11/30/16 17:41	1
Hydrometer Reading 1 - Percent Finer	1.1				% Passing			11/30/16 17:41	1
Hydrometer Reading 2 - Percent Finer	1.1				% Passing			11/30/16 17:41	1
Hydrometer Reading 3 - Percent Finer	0.6				% Passing			11/30/16 17:41	1
Hydrometer Reading 4 - Percent Finer	0.6				% Passing			11/30/16 17:41	1