



Consulting
Engineers and
Scientists

Field Sampling Plan

Approach Channel, Outer Harbor, & Advance Maintenance Dredging Areas

For Beach Maintenance – Evanston, Glencoe, Lake Bluff,
North Chicago, Illinois

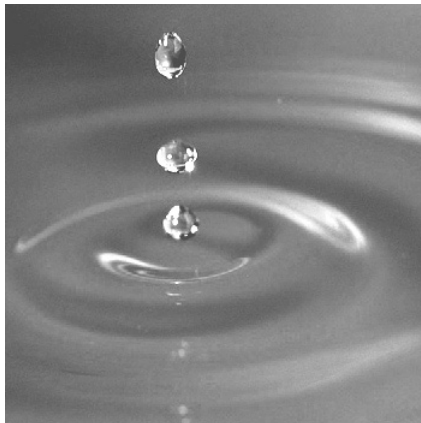
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Table of Contents

1.	Introduction	1
2.	Goals of Field Sampling Plan	2
3.	Project Location	3
4.	Background and Historical Information	4
5.	Sampling Rationale and Data Quality Objectives	6
6.	Source Area Sampling Plan	9
6.1	Sampling Areas	10
6.1.1	Approach Channel	10
6.1.2	Advance Maintenance Dredging Area	10
6.1.3	Outer Harbor Area	10
6.2	Proposed Sampling Methodology	10
6.2.1	Sample Collection Procedures	11
6.3	Sample Handling and Containers	12
6.4	Sample Analytical	14
6.4.1	PCBs	14
6.4.2	Asbestos	14
6.4.3	Particle Size Distribution	14
7.	Reporting	15
7.1	Data analysis	15
7.1.1	Illinois TACO	15
7.1.2	Asbestos	15
7.2	Summary Report	15
8.	Authors	17
9.	References	18

Table of Contents (continued)

Table

1. Proposed Sampling Locations

Figures

1. Project Location Map
2. Waukegan Harbor Dredge Areas
3. Sampling Locations and Sampling Grid

Appendix

- A. 2014 USACE Dredge Material Historical Sampling Report

1. Introduction

The United States Army Corps of Engineers (USACE) plans to dredge bottomland material from Lake Michigan to maintain navigation outside of Waukegan Harbor. As part of a Water Resources Development Act (WRDA) pilot project, the clean dredged material will be used for nourishment on six recreational beaches in four municipalities. This pilot project is the only project of its kind in the Great Lakes and will protect public parks and beaches from shoreline loss caused by high water levels. This recommended sampling plan has been developed to describe the sampling process, laboratory analytical methods, and analysis of data from the sampling of the material within the Approach Channel, Advance Maintenance Dredging Areas, and Outer Harbor. The sampling described in this plan is intended to provide an independent assessment of sediment and the health and safety of the material to be deposited for beach enhancement. The project team for this effort includes the park and recreation agencies of the four municipalities (Evanston, Glencoe, Lake Bluff, and North Chicago), and the Delta Institute, and GEI Consultants, Inc. (GEI).

2. Goals of Field Sampling Plan

This field sampling plan (FSP) has been developed by GEI to provide a detailed description of methods for the collection of samples from the Approach Channel and the Advance Maintenance Dredging Area of Waukegan Harbor. Additional sampling will be conducted in the Outer Harbor area. The USACE plans to dredge bottomland material from Lake Michigan to maintain navigation channels. The dredged material will be used through a WRDA Pilot Project for the safe use of dredged material to enhance six recreational beaches in four municipalities: Evanston, Glencoe, Lake Bluff, and North Chicago.

The goal of this FSP is to support the parks and recreation departments of the four municipalities in making independent decisions about the health and safety of material to be deposited for recreational beach enhancement. To achieve this, the FSP provides a detailed description of sampling and analytical methods necessary to collect and analyze representative samples of the material to be dredged. The samples obtained will be collected to characterize the material in the dredging area.

The data developed during this sampling will provide an independent source of information to the municipalities to document that that dredged material meets applicable environmental standards and is appropriate for beach nourishment as beneficial reuse. One post-placement sample will be collected from each receiving beach to further document conditions.

3. Project Location

Waukegan is located in Waukegan, Illinois, approximately 40 miles north of downtown Chicago, Illinois and 10 miles south of the Illinois-Wisconsin state line (Figure 1). The Federal navigation channel is comprised of three main areas: Inner Harbor, Outer Harbor, and Approach Channel. A fourth location, the Advance Maintenance Dredging area is not part of the navigation channel but is part of this municipal project.

For purposes of the sampling described in this FSP and potential dredging by USACE, the Waukegan dredging area (Area) is comprised of three of these locations: The Approach Channel, Advance Maintenance Dredging Area, and Outer Harbor. The Inner Harbor is *not* part of the project Area either for sampling or for dredging (Figure 2).

Exact plans by USACE for dredging the Outer Harbor are not known at this time, nevertheless, are included for sampling in this FSP. The Approach Channel and Advance Maintenance Dredging Area proposed dredging comprises approximately 19 acres. The Outer Harbor comprises approximately 9 acres.

4. Background and Historical Information

The following information is an overview of what the project team has been able to find and review, not an exhaustive assessment of the historic sampling that has taken place.

The USACE performs periodic dredging of deposited sediments to maintain authorized depths for commercial navigation. The Waukegan Approach Channel and Outer Harbor are maintained at a depth of -22 feet Low Water Datum (LWD) and the entrance channel and inner harbor are authorized for dredging to a depth of -18 feet LWD. Navigation dredging has been occurring at the harbor since 1889 and USACE currently dredges on an annual or biennial basis. Since the mid-1970s, USACE has only dredged within Approach Channel, averaging about 40,000 cubic yards per year.

The USACE has conducted extensive sediment collection and analysis prior to dredging at the Approach Channel. Polychlorinated biphenyls (PCBs) were detected in samples from the Approach Channel. These detections, however, have been below 0.1 micrograms per kilogram (mg/kg) since 1991. PCBs were detected in 6 of the 19 sampling events conducted between 1993-2013, with last detection in 2012. Detections in this timeframe were two orders of magnitude below the Tiered Approach to Corrective Action Objectives (TACO) health-based standard (see separate section). After other remediation efforts, Inner Harbor PCB remediation efforts were completed in 2014.

The USACE has also conducted sampling and analysis of sediment for asbestos contamination since 1997 when asbestos-containing material (ACM) was found at Illinois Beach State Park. Since 1997, USACE has observed no ACM in the Approach Channel. Additionally, the Illinois Attorney General (AG) sponsored an asbestos investigation in 2005 that analyzed health risk from asbestos concentrations in Approach Channel sediment. This study used a very sensitive laboratory method at the time, which revealed some asbestos in the lake-bottom sand in the Approach Channel. However, the concentrations were sufficiently low enough that the assessment concluded the sand represented a “minimal risk” to beach users and the Illinois AG recommended that beach nourishment using lake-bottom sand from the Approach Channel could continue. At various times between 1999 and 2013, dredge material from the Approach Channel has been used for beach nourishment at Illinois Beach State Park. Based on these historic sampling events, the Approach Channel was determined by USACE to contain clean littoral sands that have been shown to be suitable for open water disposal in Lake Michigan and beach nourishment.

Grain size analyses by USACE of the lake-bottom material at the Waukegan Harbor Approach Channel has consistently shown that the material consists of more than 90 percent fine sand. Historical grain size distributions have consistently shown the composition of the material to be nearly totally fine sand. A summary of the historical sampling is included in

the USACE 2014 report titled “Clean Water Act Section 404(b)(1) Contaminant Determination Approach Channel and Advanced Maintenance Area Waukegan Harbor, Waukegan Illinois, May 2014”, and included in Appendix A.

5. Sampling Rationale and Data Quality Objectives

The sampling proposed within this FSP is intended to characterize the material within the dredging area and to provide an independent source of information to illustrate whether dredged material meets applicable health guidelines. This information will be used as a basis for communicating with the public regarding the dredged material reuse for beach nourishment.

The area of proposed dredging for this project (Waukegan Harbor Approach Channel and Advance Maintenance Dredge Area) has been sampled repeatedly since 1979 by the USACE. It has been determined by USACE that the material in these areas is suitable for beneficial reuse as beach nourishment. USACE historic sampling has determined that the grain size of the material is suitable for use as recreational beach sand. PCBs have not been found by USACE in the sediment since 2012, and the concentration of asbestos was sufficiently low enough that the sand represented a “minimal risk” to beach users. (USACE, 2014).

The USACE may also dredge portions of the Outer Harbor for this project. Sampling of this area by the USACE was last conducted in 2006. At this time, sampling indicated that the sediment was predominantly fine sand and silt and, because of this composition, was determined to not be suitable for open water disposal or beach placement. Dredging since that time has removed much of the fine material such that grain size is no longer a constraint.

Additionally, the sampling indicated low levels of PCBs (less than 1 mg/kg), and asbestos fibers were not detected, using standard microscopy techniques. Asbestos analysis was also conducted using the elutriator method and a human health risk assessment was also performed. The analysis concluded that the very low amount of asbestos in the dredged material from the Outer Harbor does not pose an unacceptable risk to human health (USACE, 2006).

The sampling proposed in this FSP recommends additional measures beyond previous sampling efforts. Historic sampling was conducted to determine suitability for dredging and offshore disposal. Therefore, fewer samples were collected during these previous sampling events. The intent of the sampling outlined in this FSP is to assist the municipalities in determining whether dredged material is acceptable for use on the beaches. As a result, more samples will be collected during this event than during previous events by USACE. However, data received from this proposed sampling will be used in conjunction with the historic data to determine suitability of the material for beach nourishment.

Previous sampling has been conducted by the USACE between 1979 and the present time. At least 26 sampling events have occurred within the Approach Channel and adjacent Advance Maintenance Dredge Area. During these events, between three and eight samples were collected during each event for analysis by USACE.

Two documents provide guidance for sediment sampling. These include:

- United States Environmental Protection Agency (USEPA)-USACE Great Lakes Dredging Material Testing and Evaluation Manual, September 30, 1998
- USEPA-USACE Evaluation of Dredged Material Proposed for Discharge in Waters of the US – Testing Manual, February 1998 (aka Inland Testing Manual)

These documents do not specify the amount of sampling. Because each site is unique, sampling plans are to be tailored to individual sampling location and data objectives. These documents provide guidance for sampling, and indicate that a “sediment sampling program for a 404(b)(1) evaluation should collect samples that are representative of the materials to be dredged, and the sediments at the disposal site” (USEPA-USACE, 1998a), and that “the primary objective of sediment collection is to obtain samples to adequately and accurately characterize the dredging and reference area” (USEPA-USACE, 1998b).

As Lake Michigan is largely a closed system, and the state of Illinois does not have similar guidance, additional relevant guidance was consulted. The Wisconsin Department of Natural Resources (2015) provides a suggested minimum amount of sampling based on the volume of sediment to be removed. This guidance indicates that for 30,000 to 100,000 cubic yards of sediment, at least five samples should be collected to characterize this volume of material.

The sampling strategy outlined in this FSP has been developed to characterize the sediment material and provide the necessary data to communicate the potential hazards (or lack thereof) associated with the dredged material to the municipalities that will receive the sand for beach replenishment. The sampling outlined in this FSP was designed to meet and exceed the data quality objectives (DQOs) for the project.

The items listed below are the DQOs for the project. These DQOs are a set of qualitative and quantitative statements of the overall uncertainty a decision maker is willing to accept in results or decisions derived from environmental data. The objective of the sampling plan should address the type of information to be obtained, the decisions that will be made with that information, and level of uncertainty that is acceptable for those decisions. The DQOs include:

- The dredge area (Approach Channel and Advance Maintenance Area) is approximately 18 acres. The Outer Harbor is an additional 9 acres.
- Abundant historic sampling has been conducted, which will be supplemented by the samples collected for this project.
- While sampling has occurred more than two dozen times since 1979, the number of samples collected during each sampling event for characterization was between three and eight samples.

- Most of the historic sampling was used to determine the suitability of the material for open-water disposal.
- Only recent sampling events (since 1997) have considered the safety of the dredged material for beach nourishment purposes.
- No clear Illinois or federal guidance is available to indicate the amount of sampling necessary to characterize the material.
- No guidance exists—federally or among states—that characterizes safe asbestos levels in recreational beach sand.
- The intent of this sampling is to provide data regarding the potential exposure and health risks associated with the dredged material.
- The sampling data will be used for public outreach to communicate the benefits and potential hazards associated with the dredged material to beach users.

As such, this FSP recommends additional measures beyond historic protocols including:

- More than twice the number of samples taken compared to the upper range of historic USACE sampling events.
- More than three times the number of samples taken compared to Wisconsin Department of Natural Resources guidance.
- Testing conducted while material is in situ (in place, still underwater) so that determinations can be made by municipalities about whether to move forward with beach placement.

6. Source Area Sampling Plan

Samples of the sediment will be collected for laboratory analysis from three areas – the Approach Channel, Advance Maintenance Dredge Area, and Outer Harbor. Together, these areas comprise approximately 27 acres of open water just beyond the break wall outside of Waukegan Harbor. The samples will be collected in-place and used to characterize the sediment prior to dredging.

The USACE has collected samples from the Approach Channel as many as 26 times since 1979. Sampling ranged between three and eight samples per event. The USACE determined that the sampling frequency was consistent with other Great Lakes harbors in the littoral zone, and with the Title 40 Code of Federal Regulations (CFR) Subsection 230.60, which defines testing requirements for dredged or fill material. The historical and extensive sediment and water sampling conducted at the Waukegan Harbor Approach Channel was determined to satisfy these criteria. The historical and extensive sediment and water sampling conducted at the Waukegan Harbor Approach Channel was determined to satisfy these criteria. The historic sampling events have revealed concentrations below health-based criteria. The intent of the sampling by USACE over the years was to determine the presence or absence of contaminants in the sediment and the concentrations of those contaminants for dredging and disposal purposes.

The intent of the sampling for this project, however, is to collect representative samples of the material to be dredged in order to provide an independent source of information to the municipalities to illustrate that dredged material meets health guidelines and is safe to place on beaches as beneficial reuse. The information collected during this sampling event will be used in conjunction with the historical data to provide this determination.

Various documents provide guidance for the development of a sampling plan to characterize sediment volumes. To adequately characterize the sediment for the intended data objectives, we propose to collect one sample per acre for a total of 27 samples. Material recovered from the sampling device will be composited into a single sample representing each location. The depth of maintenance dredging in the Approach Channel is -22 feet LWD. Dredging and sediment depths are contained in USACE's "Public Beach Protection in 4 Illinois Coastal Communities Beneficial Use of Dredged Material Pilot Project Program Civil Engineering Appendix – Plans and Specifications," and indicate that in the Approach Channel the sediment thickness is between 1 and 3 feet thick, and in the Advance Maintenance Dredging Area the sediment is as much as 10 feet thick. As of the time this FSP was developed, sediment thickness in the Outer Harbor was not readily discernible from the literature reviewed.

Though dredging from the Outer Harbor is uncertain at this time, sampling is also proposed for the Outer Harbor.

6.1 Sampling Areas

The sampling areas are illustrated in the Figures section. Sampling locations within each area are discussed below.

6.1.1 Approach Channel

The USACE proposed to dredge the Approach Channel. The Approach Channel is approximately 1,300 feet by 500 feet, which is 650,000 square feet, or approximately 15 acres. The Approach Channel is illustrated in the Figures section, portioned into approximately acre-sized grid areas. A sample will be collected from each of these grids, as illustrated, for a total of 15 samples from the Approach Channel. The location coordinates for each of the proposed sample locations are summarized in Table 1.

Sediment thickness within the Approach Channel has been determined to be approximately 1 to 3 feet thick.

6.1.2 Advance Maintenance Dredging Area

The USACE proposes to dredge from the western portion of the Advance Maintenance Dredging Area, located immediately to the north of the Approach Channel. This portion of the Advance Maintenance Dredging Area is approximately 650 feet by 250 feet, which is 162,500 square feet, or approximately 3.7 acres. The Advance Maintenance Dredging Area is illustrated on the Figures section, portioned into approximately acre-sized grid areas. A sample will be collected from each of these grids, as illustrated, for a total of four samples from the Advance Maintenance Dredging Area. The location coordinates for each of the proposed sample locations are summarized in Table 1.

Sediment thickness in the Advance Maintenance Dredging Area has been determined to be as much as 10 feet thick.

6.1.3 Outer Harbor Area

The USACE may also dredge from the Outer Harbor area. The Outer Harbor is approximately 9 acres. The Outer Harbor area is illustrated in the Figures section, portioned into approximately acre-sized grid areas. A sample will be collected from each of these grids, as illustrated, for a total of six samples from the Outer Harbor area. The location coordinates for each of the proposed sample locations are summarized in Table 1.

6.2 Proposed Sampling Methodology

GEI has independently recommended this sampling program, based on analysis of available information, the goals of the proposed sampling, and USEPA/USACE guidance. The Illinois

State Geological Survey (ISGS) Prairie/Research Institute will conduct the actual sampling. The collected samples will be submitted to independent laboratories for testing and analysis.

6.2.1 Sample Collection Procedures

Samples of the sediment will be collected by ISGS for laboratory analysis prior to dredging by the USACE. The ISGS will attempt to collect a sample from each grid as discussed above following standard health and safety protocols while on the open water. Based on the conditions during sampling, it is possible that the ISGS will be unable to collect samples from each designated area.

Collection of representative sediment sampling depends on the depth of water in the sampling area, the type of material to be sampled, the thickness of the materials to be sampled, and the desired data objectives of the project.

The locations for all samples will be determined prior to sampling and the coordinates loaded into a hand-held Global Positioning System (GPS). The GPS unit will be used to navigate to the sampling location and position the sampling vessel. Sampling will be performed from the Illinois Water Survey pontoon boat.

Sediment core samples will be obtained by the vibracore method. This method of coring allows for efficient sampling of sediments. The vibracore system will advance core tubes (2 to 4-inch diameter polycarbonate [Lexan] or aluminum) into the sediment. The core sampler will be advanced to a depth of up to 10 feet into the sediment. This procedure will require the use of a winch to raise the sampling system (core tube and vibracore device) and slowly lower the coring tube through the water to the top of sediment surface. A motor is used to slowly vibrate the core tube into the sediments to the target depth. Penetration rates will vary depending on the sediment type.

The vibracore and core tube will be raised to the boat deck, keeping the core vertical to the extent possible. A cap will be placed on the bottom of the core tube and secured with tape. The top of the core tube will then be removed from the vibracore head. Total sediment recovery within the core will be recorded. Overlying water within the core will then be drained, the top of the tube will be cut just above the sediment line, and then secured with a cap.

Upon retrieval, sediments within the core will be measured and compared to the penetration depth to determine core recovery. Core tubes will be labeled to identify the sample location, depth, top of core, sample date, penetration, and recovery.

If sediment coring and sampling with vibracore are found to be infeasible or impractical, alternate sampling methods will be considered, such as a ponar or clam shell sampling device.

6.3 Sample Handling and Containers

Following retrieval, sediment within the sample tubes (or alternative sampling device) will be processed and sampled. Sample processing includes logging sediments and collection of sediment for laboratory analysis. This narrative is prepared for vibrocore samples, but all samples collected by alternative methods (as necessary) will be handled in the same way.

Cores will be kept upright from the time of sampling to the time of processing. At the time of processing, the cap will be removed and the length of the sediment in the core will be measured. This measurement will be checked against the measured sediment at the time of sampling, checked for settling of the sediment after collection and transport. Any measurable difference between the top of sediment and the “mud line” marked on the core liner by the boat crew will be noted and recorded. A thin probe will then be inserted into the top of sediment to determine the consistency of the material. If the material is relatively non-saturated (firm), the cap will be replaced, and the core cut for opening. The core tube will be cut lengthwise on opposite sides. The core tube will then be opened and separated into two halves using putty knives or flat spatulas. Core identification information (core identification number, drive length, and recovery length) will be written on a white dry-erase board, and a photograph will be taken of the exposed surface of the core, including the white board. A scale or tape measure will be placed along the opened core to provide scale for the photograph.

The sediment from each sample will be logged using the Unified Soil Classification System (USCS). Attributes such as color, mineralogy, cementation, moisture content, iron (or other) staining, presence and type of organic matter, shells, or debris including visible ACM will be recorded. Any odors (i.e., organic, hydrogen sulfide, fuel oil-like, etc.) will be noted and recorded.

After logging, the core will be processed for sampling. Because the results of analyses are intended to characterize the entire thickness and area of the proposed dredge material, a composite sample will be collected at each identified coring location. The core liner will be opened and material placed into a clean (unused) aluminum or stainless-steel pan for homogenization. The material will be mixed until it is visibly homogeneous. Silt and clay aggregates will be broken up, and easily retrievable, obviously non-native material (e.g., brick, concrete, angular gravel) and material that is not soil or sediment (e.g., shells, worms) will be discarded. Large vegetated material that is not obviously decomposed (e.g., root wads/mats, wood debris, green plant material) will also be removed. Any obvious pieces of ACM, such as Transite materials, will be identified and saved for future identification. Homogenization will follow the USEPA quartering procedure, where the sample material is divided into equal quarters in the mixing pan, each quarter is mixed individually, the quarters are then combined in two halves that are individually mixed followed by the entire sample being mixed again. This procedure will be repeated several times until the sample is adequately mixed.

An aliquot of the homogenized material will be placed into appropriate containers for submittal to the laboratory. The appropriate sample information (i.e., project name or number, sample identification, collection date and time, analysis requested, preservative, sampler's initials) will be placed on the sample label and on the core sampling form.

The required sample containers, handling, and hold times for the recommended analytes are as follows:

Analyte	Method	Container Type	Preservative	Holding Time	Required Volume
PCBs	8082A	Amber glass with Teflon-lined cap	Cool to $\leq 4^{\circ}\text{C}$	14 days until extraction, 40 days from extraction to analysis	100 g or 8 oz jar
Asbestos	ASTM D7521 ¹	8-oz poly jar	None	Unlimited	8 oz poly jar
Grain Size	ASTM D422	Plastic zip-close bag	None	Unlimited	One 1-gallon zip-close bag ²

1. **Notes:**

- Samples collected from the lake bottom will be shipped to EMSL and analyzed by ASTM Method D7521 - Standard Test Method for Determination of Asbestos in Soil. If asbestos is found that portion of the sample will be run by Fluidized Bed Asbestos Segregator.
 - Approximately 500g is needed per sample, so one 1-gallon bag should suffice. It may be necessary to double bag these samples to keep them from leaking during transport.
- ASTM – ASTM International
C – Celsius
g – grams
oz - ounce
PCBs – polychlorinated biphenyls

For quality control measures, duplicate samples will be collected at a rate of 10 percent of all samples collected, and matrix spike/matrix spike duplicates sampled at a rate of 5 percent of all samples collected.

Two additional 8-ounce sample jars will be filled with aliquots of the composited samples, labeled, and stored in archive for potential additional future analysis, if necessary.

At the time of sampling, a chain of custody record for the samples will be completed. The chain of custody will be filled out neatly and in permanent ink. The chain of custody will record the project name and number, the sampler's name(s), the sample identification number, the date and time of sample collection, the number of sample containers, and any additional information to fulfill project, client or regulatory requirements. The type of analysis required (including laboratory method) requested and the preservative (if appropriate). The chain of custody will be signed and dated by the relinquisher and receiver of samples as indicated.

Collected samples will be placed in coolers with appropriate preservatives for shipment or courier pickup to the laboratory.

6.4 Sample Analytical

Samples collected from each of the sample locations will be submitted for laboratory analysis. Samples will be analyzed for PCBs, asbestos, and particle size distribution by the laboratories listed below.

6.4.1 PCBs

The concentration of total PCBs will be determined by analysis of samples following USEPA Method 3546/8082A. Samples for PCB analysis will be submitted to Eurofins Test America Laboratory.

6.4.2 Asbestos

All samples collected will be analyzed by ASTM International (ASTM) Method D7521 - Standard Test Method for Determination of Asbestos in Soil, otherwise known as the “sieve method.” This method was not available at the time of the 2005 study and is the most applicable analytical method for identifying asbestos in soil, sand, and sediment. This method identifies asbestos in sand, provides an estimate of the concentration of asbestos in the sand submitted, and can also provide a concentration of asbestos reported as the number of asbestos structures per gram of sample. This can be used for a risk-based assessment of the data received. The emphasis is on detection and analysis of sieved particles for asbestos in the sand. It is highly unlikely, but if asbestos debris is identifiable as bulk material and is readily separable from the sand (like ACM Transite material) it will be analyzed and reported separately. Asbestos is identified and quantified by polarized light microscope (PLM) at each sieve fraction. Optional transmission electron microscope (TEM) identification and quantification is possible. The use of TEM analysis will be evaluated as data is received.

If a sample is discovered to contain observable asbestos in any sieve fraction, then the lab will take the same archived sample and run Fluidized Bed Asbestos Segregator (FBAS) analysis to determine asbestos structures per cubic centimeter. Samples for asbestos analysis will be submitted to EMSL Analytical, Inc.

6.4.3 Particle Size Distribution

Samples will be submitted to EMSL Analytical, Inc. for analysis of grain size distribution sieve or hydrometer (ASTM D422). Grain size distribution analysis will include sieving through #4, #8, #10, #16, #30, #40, #50, #80, #100, and #200 sieves. For quality control measures, duplicate samples will be collected at a rate of 10 percent of all samples collected for geotechnical analysis. This analysis will determine the size distribution of particles within the sediment, as well as the percentage of fines (passing #200 sieve) within the sediment.

7. Reporting

7.1 Data analysis

Following sample and laboratory analysis, the data will be analyzed to illustrate the suitability of the dredged material for use on the beaches. This analysis will include the contaminant concentrations and potential health risks.

7.1.1 Illinois TACO

The sample data will be compared to established Illinois Environmental Protection Agency (IEPA) screening levels. The screening levels are in Title 35 Illinois Administrative Code (IAC) Part 742 – Tiered Approach to Corrective Action Objectives (TACO). TACO is the Illinois EPA's method for developing remediation objectives soil and groundwater. These objectives protect human health and consider site conditions and land use. Remediation objectives generated by TACO are risk-based and site-specific. Sample analytical results from soil will be compared to the Tier 1 Remediation Objectives (ROs) listed in TACO. A Tier 1 evaluation compares the concentrations of contaminants of concern to baseline remediation objectives. Tier 1 enables you to choose between residential and industrial/commercial use of a site and provides pre-calculated "Look Up" Tables that can serve as a screening tool.

The screening level for PCBs defined in Section 742, Table A, Tier 1 Soil Remediation Objectives for Residential Properties is 1 mg/kg.

7.1.2 Asbestos

The analytical data from the samples collected will be compared to the historic analytical data as reported by others since the late 1990s.

That project analyzed health risk from asbestos concentrations in Waukegan Approach Channel sediment. The study at the time, used what was known as “Superfund/Elutriator.” That was the analytical “standard” at the time. ASTM D7521 and FBAS are currently considered state of the art for this type of analysis and will allow for risk-based assessment of the analytical data.

7.2 Summary Report

Following the sample collection activities and receipt of sample analytical results, a sampling report will be prepared describing the activities completed. The report will include the following:

- A description of site history and definition of possible contamination sources.
- A narrative describing the fieldwork performed and the degree to which these activities can provide the approximate extent and estimated volume of impacted Channel.
- A description of any variance from the work plans.
- A description of sediment characteristics as determined from sediment cores.
- Tables showing:
 - A list describing the sampling locations (location coordinated, water depths, sediment thickness encountered).
 - Summary tables of analytical results and basic descriptive statistics.
- Figures showing:
 - Sampling locations.
 - Sediment core logs.
 - The extent of impacted sediment.
- Photographs of the site and sampling activities.
- An analysis of sampling data and discussion of risk assessment scenarios.

8. Authors

The GEI authors of this sampling plan have extensive experience in the collection of subsurface materials for a variety of sites throughout the Great Lakes region and the United States. Together, they bring nearly 90 years of experience to the development of this plan and the characterization of subsurface materials. The primary authors of this sampling plan:

Allan Blaske is a professional geologist with more than 30 years of experience conducting and managing environmental and geotechnical field investigations, performing site investigations and remedial alternatives for impacted soil and groundwater, performing remedial system design, and preparing compliance reports for various regulatory agencies. Mr. Blaske has performed and managed field activities including environmental and geotechnical sampling of soil, sediment, and groundwater. He has managed the characterization of a variety of projects, from small gas station sites to a multiple square mile area environmental impact assessment for a copper mine project.

Jamie Laubenthal is the asbestos practice leader at GEI Consultants. He has managed asbestos-related projects for local, national, and global clients for over 25 years. The asbestos work includes asbestos compliance training, corporate policy review and enhancement, asbestos inspections, abatement project oversight, and preparation of asbestos operations and maintenance (O&M) plans for sites across the country.

Jamie Matus has more than 30 years of experience with complex geotechnical, environmental, and construction related projects, including forensic soils analysis. Mr. Matus conducts site assessments and hydrological investigations leading to innovative remediation solutions for public and private clients.

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Table

Figures

Appendix A

2014 USACE Dredge Material Historical Sampling Report