DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF:

March 8, 2013

Environmental Analysis Team

SUBJECT: Sandusky Harbor, Erie County, Ohio - Request for Section 401 Water Quality Certification for Scheduled 2013 Maintenance Dredging Project

Mr. Scott J. Nally
Director
Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049
Attn: Ric Queen

Dear Mr. Nally:

Enclosed for your review and comment is the Section 404(a) Public Notice and Section 401 State Water Quality Certification (WQC) application for our scheduled 2013 maintenance dredging project at Sandusky Harbor, Ohio. This project entails the maintenance dredging of authorized Federal navigation channels, and placement of the associated dredged material in the existing open-lake placement area in Lake Erie. The Public Notice has been prepared in conformance with U.S. Army Corps of Engineers (USACE) regulation, "Practice and Procedure: Final Rule for Operation and Maintenance of Army Corps of Engineers Civil Works Projects involving the Discharge of Dredged Materials into Waters of the United States or Ocean Waters," 33 Code of Federal Regulations (CFR) 337.1.

The USACE - Buffalo District, is requesting Ohio Environmental Protection Agency (OEPA) WQC for the scheduled 2013 maintenance dredging project at Sandusky Harbor, or waiver thereof, under Section 401 of the Clean Water Act.

The following items are contained within this package:

a. Enclosure 1 is the Section 404(a) Public Notice.
b. Enclosure 2 is our Section 401 WQC application.
c. Enclosure 3 is an aerial photograph of Sandusky Harbor.
d. Enclosures 4 and 5 are contract drawings depicting the minimum degradation and preferred alternatives.
e. Enclosure 6 is most recent Tiered Evaluation on channel sediments.

SUBJECT: Sandusky Harbor, Erie County, Ohio - Request for Section 401 State Water Quality Certification for Maintenance Dredging

Please note that all associated National Environmental Policy (NEPA) documents (Environmental Impact Statement and Environmental Assessments) and Section 404(b)(1) Evaluations have been completed for this maintenance dredging project, and were previously furnished to your office. The majority of the information requested in Item 10 of the WQC application is contained in these documents in further detail.

As you know, we require WQC in order to accept contract bids on this project. The bid opening date has been scheduled for June 22, 2013 and our goal is to secure the WQC by June 15, 2013. As has been standard practice with our less controversial dredging projects recently, we respectfully request that no public hearing be scheduled for this application unless significant comments are received specifically requesting one. Please advise us regarding the status of the WQC by March 29, 2013. We appreciate your cooperation in this matter.

Questions pertaining to this matter should be directed to Mr. Eric E. Hannes at (716)879-4311, by writing to the following address: U.S. Army Corps of Engineers, 1776 Niagara Street, Buffalo, New York, 14207-3199, or by e-mail at: Eric.E.Hannes@usace.army.mil.

Sincerely,

Martin P. Wargo, PWS
Supervisory Biologist
Environmental Analysis Team

Enclosures

US Army Corps of Engineers®

Public Notice

Issuing Office: CELRB-PM-EA
Notice No: SANDUSKY-13

Published: 8 MAR 2013
Expires: 7 APR 2013

OPERATION AND MAINTENANCE
DREDGING AND DREDGED MATERIAL PLACEMENT

SANDUSKY HARBOR

ERIE COUNTY, OHIO

This Public Notice has been prepared and distributed in conformance with U.S. Army Corps of Engineers (USACE) regulation, "Practice and Procedure: Final Rule for Operation and Maintenance of Army Corps of Engineers Civil Works Projects involving the Discharge of Dredged Materials into Waters of the United States or Ocean Waters," 33 Code of Federal Regulations (CFR) 337.1. Its purpose is to specify what dredged/fill materials would be discharged into waters of the United States by implementation of the proposed action, advise all interested parties of the proposed project, and to provide an opportunity to submit comments or request a public hearing.

The USACE - Buffalo District anticipates the need to dredge and place material excavated from the Federal navigation channels of the Sandusky Harbor project, including the Straight Channel, Bay Channel, and Moseley Channel in order to maintain sufficient depth for deep-draft vessels. The attached map (Figure 1) shows the authorized limits and depths of the Federal navigation channels. To ensure that the authorized depth in Sandusky Harbor is maintained and to account for dredging tolerance, up to an additional one foot of material may be dredged. An estimated total of approximately 225,000 cubic yards of material will be dredged from Sandusky Harbor Federal navigation channels during the 2013 dredging operation.

The 2013 dredging operation at Sandusky Harbor is tentatively scheduled to be performed during the period between 1 July and 15 March.

A contractor of the Federal government will accomplish the project. Sediments will be removed from the channel bottom by a mechanical or hydraulic dredge and placed into hoppers aboard ship or scow for transport to the placement areas. The method of excavation will be determined by the contractor performing the maintenance dredging. In previous years, clamshell and hopper dredges have been used to complete the required work.

Material in the Sandusky Harbor Federal navigation channels consists primarily of silts and

clays, with some fine sands and gravels. Sandusky Harbor sediment data was analyzed in 2013 to specifically evaluate its suitability for open-lake placement in accordance with joint U.S. Environmental Protection Agency (USEPA)/USACE protocols contained in the Great Lakes Dredged Material Testing and Evaluation Manual (1998). The material was sampled, tested and evaluated using a tiered approach pursuant to these protocols and guidelines. Based on this Tiered Evaluation, the USACE has determined that the material proposed to be dredged from the Sandusky Harbor Federal navigation channels meets Federal guidelines and is suitable for open-lake placement. Therefore the material dredged from the Sandusky Harbor channels will be placed into the northwest corner of the eastern half of the existing, authorized open-lake placement area (Figure 2). This site has been used previously by the USACE for the placement of Sandusky Harbor dredged material. Material present in the channels between Stations 265+00 and 220+00 (near junction of the Straight and Moseley Channels) has been determined to be predominantly sand in nature. However, existing project depths in this reach of the harbor are already below authorized project depths and will not be dredged during the FY13 dredging cycle. Therefore, no material to be dredged during this dredging cycle is proposed to be placed at the existing nearshore area near Cedar Point. Figure 3 depicts the approximate location of dredging in this portion of the channel.

Water Quality Certification (WQC) from the Ohio Environmental Protection Agency (OEPA) is required for this action, pursuant to Section 401 of the Clean Water Act. Therefore, a copy of this Public Notice has been provided to OEPA requesting WQC, or waiver thereof, for the associated placement of dredged material.

The environmental effects of the dredging operation are documented in the ***Final Environmental Impact Statement, Operation and Maintenance, Sandusky Harbor, Ohio (1975); and Environmental Assessment and Section 404(b)(1) Evaluation, Operation and Maintenance, Sandusky Harbor, Ohio (1985).*** These documents, and supplemental documentation, have been submitted to USEPA. Copies are available for examination at the Buffalo District office.

There are no listed historic properties or properties determined as being eligible for listing in the National Register of Historic Places that will be affected by this project. By this notice, the National Park Service is advised that currently unknown archaeological, scientific, prehistorical or historical data may be lost or destroyed by the work to be accomplished.

This office has determined that the proposed project will have No Effect upon any species proposed or designated by the U.S. Department of the Interior as threatened or endangered, nor will the proposed work result in an Adverse Modification of designated critical habitat for any such species. Therefore, unless new information indicates otherwise, no further consultation pursuant to Section 7 of the Endangered Species Act Amendments of 1978 will be undertaken with the U.S. Fish and Wildlife Service.

This work will be undertaken in a manner consistent, to the maximum extent practicable, with the State of Ohio Coastal Management Program. A Coastal Management Program Federal Consistency Determination has been submitted to the Ohio Department of Natural Resources (ODNR) documenting this determination.

The decision whether to perform dredging has been based on an evaluation of the probable impact, including cumulative impacts, of the proposed activity on the public interest. That decision reflects the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal has been balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal have been considered including the cumulative factors thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

This activity is being coordinated with the following agencies, as well as other appropriate Federal, State and local agencies and organizations:

National Park Service
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Ohio Historic Preservation Office
U.S. Coast Guard
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency

Any interested parties and/or agencies desiring to express their views concerning the proposed dredging and open-lake placement of dredged material may do so by filing their comments, in writing, no later than 30 days from the date of this notice. Any person who has an interest which may be affected by the proposed dredging and open-lake placement of this dredged material may request a public hearing. The request must be submitted in writing to the undersigned within 30 days of the date of this Public Notice. The request must clearly set forth the interest which may be affected, and the manner in which the interest may be affected, by this activity.

Interested parties are encouraged to contact the USACE - Buffalo District with their comments regarding the proposed dredging of Sandusky Harbor. Please review this Public Notice and send your comments in writing within 30 days to the following e-mail address:

SanduskyDredging@usace.army.mil

or via mail to:

U.S. Army Corps of Engineers, Buffalo District
Environmental Analysis Team
1776 Niagara Street
Buffalo, NY 14207-3199
ATTN: Environmental Analysis - Sandusky Dredging

This Public Notice is published in conformance with 33 CFR 337.1. All dredging and dredged material discharge will be performed in conformance with Sections 313 and 404 of the Clean Water Act (33 USC 1323 and 1344, respectively).

Martin P. Wargo, PWS
Supervisory Biologist
Environmental Analysis Section

Attachments

NOTICE TO THE POSTMASTER: It is requested that the above notice be conspicuously displayed for 30 days from the date of issuance.

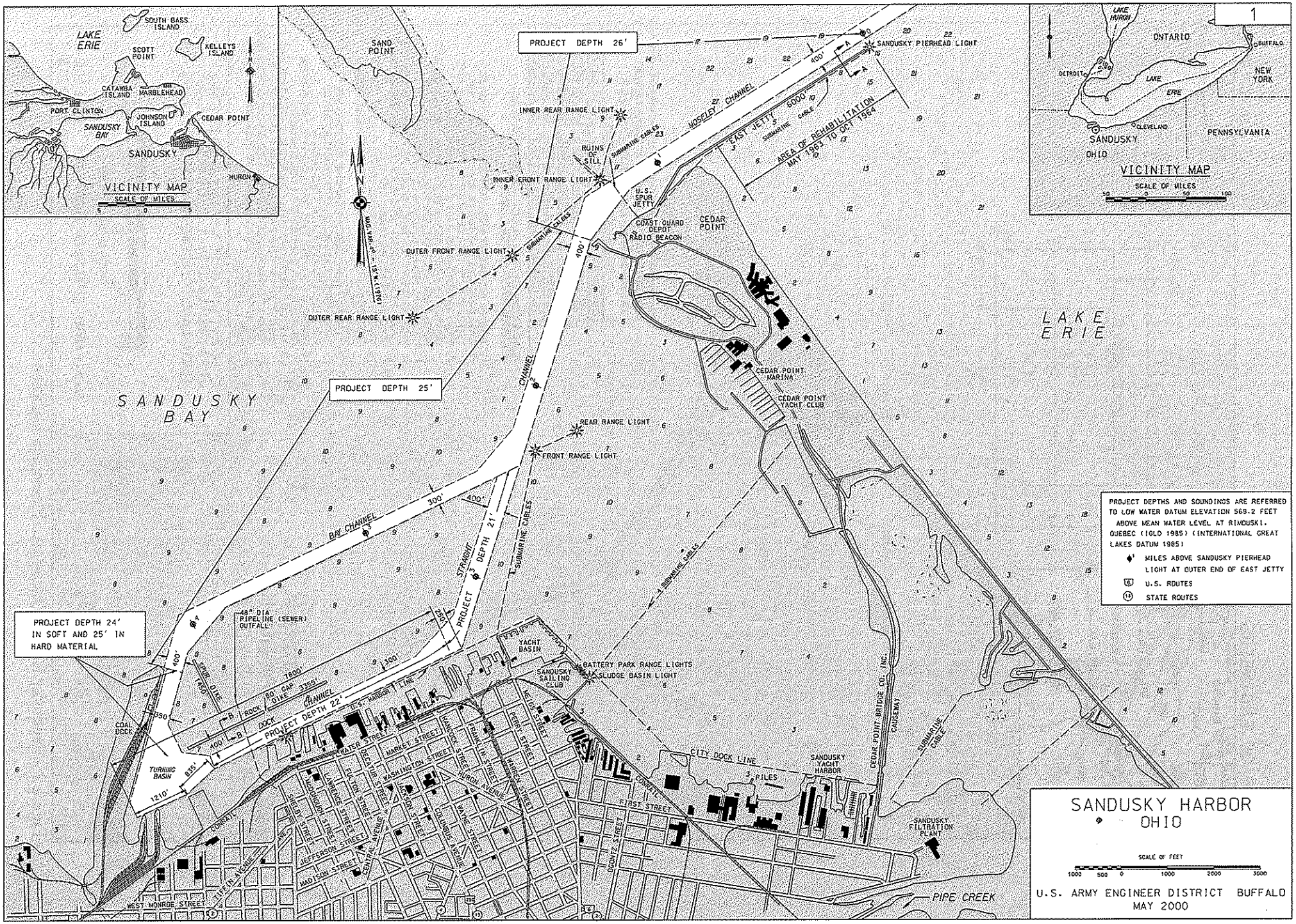


Figure 1 - Sandusky Harbor Map

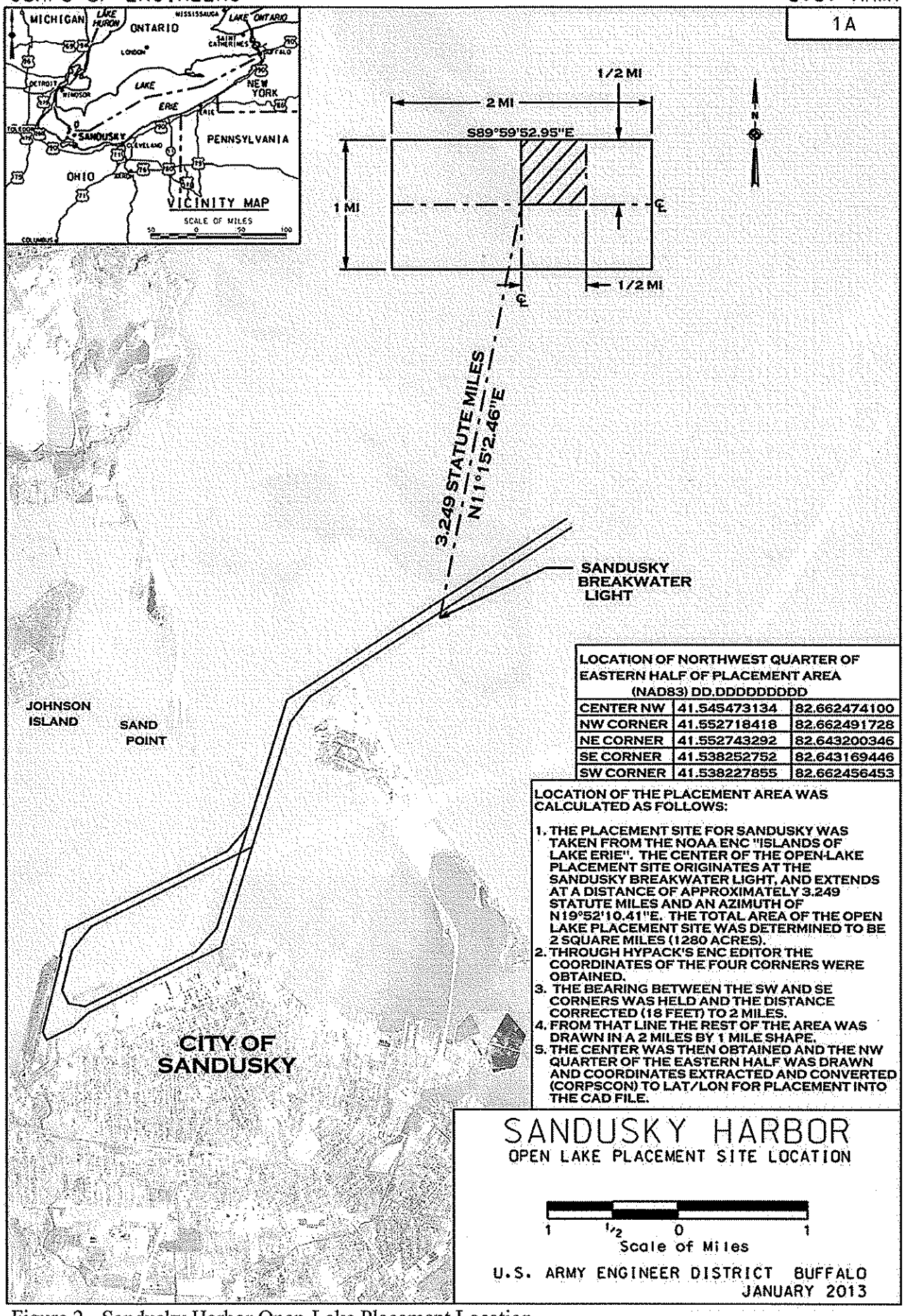


Figure 2 - Sandusky Harbor Open-Lake Placement Location

(DREDGE 47 ACRES, LOCATIONS AND EXTENTS WILL BE ADJUSTED BASED UPON ACTUAL SHOALING AND LOCATIONS [redacted])

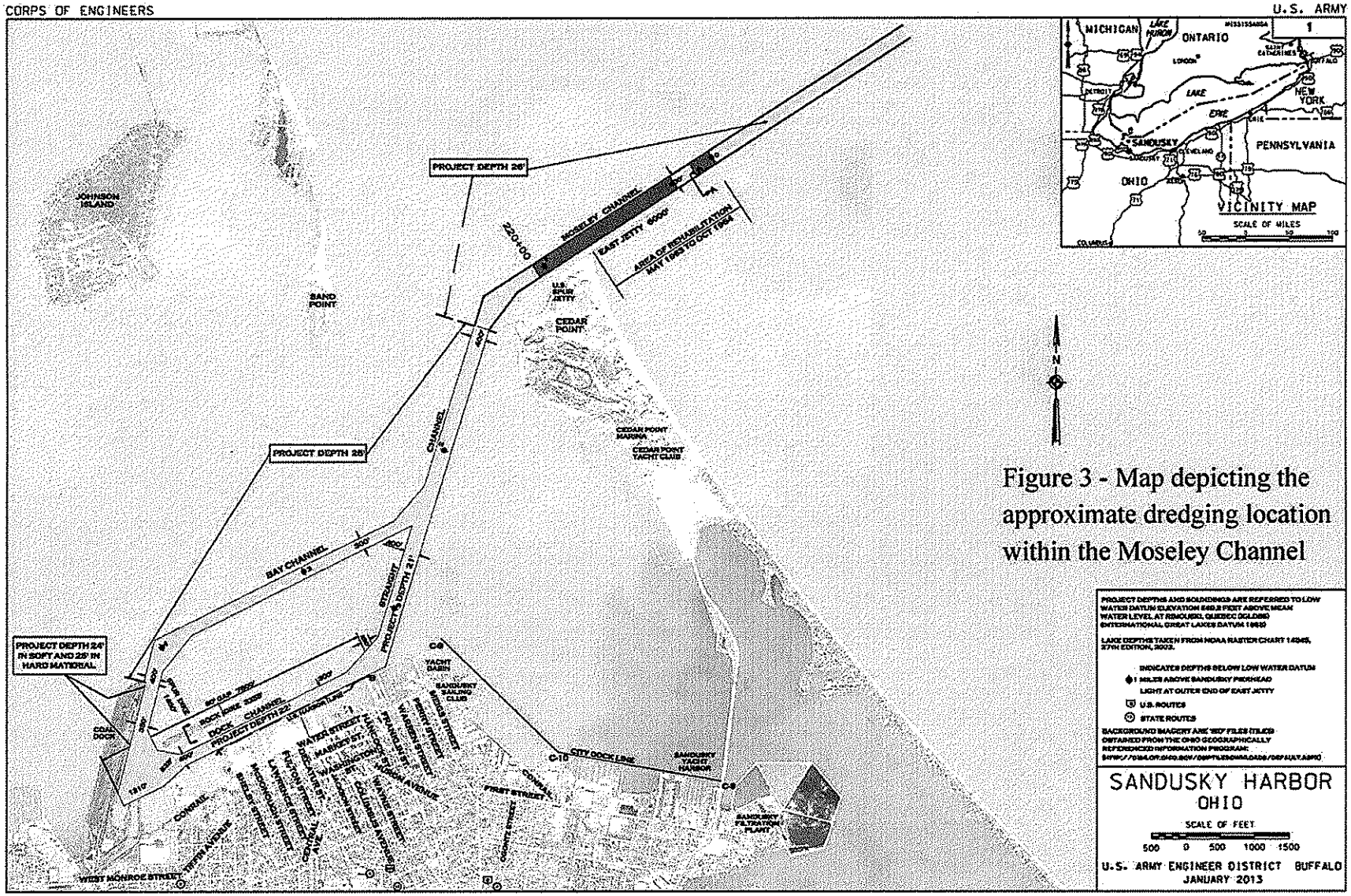


Figure 3 - Map depicting the approximate dredging location within the Moseley Channel

APPLICATION FOR OHIO EPA
SECTION 401 WATER QUALITY CERTIFICATION

Effective October 1, 1996
Revised August, 1998

This application must be completed whenever a proposed activity requires an individual Clean Water Act Section 401 Water Quality Certification (Section 401 certification) from Ohio EPA. A Section 401 certification from the State is required to obtain a federal Clean Water Act Section 404 permit from the U.S. Army Corps Engineers, or any other federal permits or licenses for projects that will result in a discharge of dredged or fill material to any waters of the State. To determine whether you need to submit this application to Ohio EPA, contact the U.S. Army Corps of Engineers District Office with jurisdiction over your project, or other federal agencies reviewing your application for a federal permit to discharge dredged or fill material to waters of the State, or an Ohio EPA Section 401 Coordinator at (614) 644-2001.

The Ohio EPA Section 401 Water Quality Certification Program is authorized by Section 401 of the Clean Water Act (33 U.S.C. 1251) and the Ohio Revised Code Section 6111.03(P). Ohio Administrative Code (OAC) Chapter 3745-32 outlines the application process and criteria for decision by the Director of Ohio EPA. In order for Ohio EPA to issue a Section 401 certification, the project must comply with Ohio's Water Quality Standards (OAC 3745-1) and not potentially result in an adverse long-term or short-term impact on water quality. Included in the Water Quality Standards is the Antidegradation Rule (OAC Rule 3745-1-05), effective October 1, 1996, revised October, 1997 and May, 1998. The Rule includes additional application requirements and public participation procedures. **Because there is a lowering of water quality associated with every project being reviewed for Section 401 certification, every Section 401 certification applicant must provide the information required in Part 10 (pages 3 and 4) of this application.** In addition, applications for projects that will result in discharges of dredged or fill material to wetlands must include a wetland delineation report approved by the Corps of Engineers, a wetland assessment with a proposed assignment of wetland category (ies), official documentation on evaluation of the wetland for threatened or endangered species, and appropriate avoidance, minimization, and mitigation as prescribed in OAC 3745-1-50 to 3745-1-54. Ohio EPA will evaluate the applicant's proposed wetland category assignment and make the final assignment.

Information provided with the application will be used to evaluate the project for certification and is a matter of public record. If the Director determines that the application lacks information necessary to determine whether the applicant has demonstrated the criteria set forth in OAC Rule 3745-32-05(A) and OAC Chapter 3745-1, Ohio EPA will inform the applicant in writing of the additional information that must be submitted. The application will not be accepted until the application is considered complete by the Section 401 Coordinator. An Ohio EPA Section 401 Coordinator will inform you in writing when your application is determined to be complete.

Please submit the following to "Section 401 Supervisor, Ohio EPA/DSW, P.O. Box 1049, Columbus, Ohio 43216-1049:

- Four (4) sets of the completed application form, including the location of the project (preferably on a USGS quadrangle) and 8-1/2 x 11" scaled plan drawings and sections.
- One (1) set of original scaled plan drawings and cross-sections (or good reproducible copies).

(See Application Primer for detailed instructions)

1. The federal permitting agency has determined this project: (check appropriate box and fill in blanks)

   a. X requires an individual 404 permit/401 certification- Public Notice # (if known) SANDUSKY-13

   b. ____ requires a Section 401 certification to be authorized by Nationwide Permit #_____

   c. ____ requires a modified 404 permit/401 certification for original Public Notice #_____

   d. ____ requires a federal permit under _____ jurisdiction identified by #_____

   e. ____ requires a modified federal permit under_____ jurisdiction identified by #_____

Click to clear all entered information (on all 4 pages of this form) CLEAR

Enclosure 2

2. Application number (to be assigned by Ohio EPA):

3. Name and address of applicant:
Martin P. Wargo, PWS
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

Telephone number during business hours:
(_____) _____ (Residence)
(716) 879-4116 (Office)

3a. Signature of Applicant: Martin P. Wargo Date: 3/7/13

4. Name, address and title of authorized agent:
Eric E. Hannes
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199

Telephone number during business hours:
(_____) _____ (Residence)
(716) 879-4311 (Office)

4a. Statement of Authorization: I hereby designate and authorize the above-named agent to act in my behalf in the processing of this permit application, and to furnish, upon request, supplemental information in support of the application.

Signature of Applicant: Martin P. Wargo Date: 3/7/13

5. Location on land where activity exists or is proposed. Indicate coordinates of a fixed reference point at the impact site (if known) and the coordinate system and datum used.

Address:

See Attached Continuation Sheet

Street, Road, Route, and Coordinates, or other descriptive location

Watershed | County | Township | City | State | Zip Code

6. Is any portion of the activity for which authorization is sought complete? _____ Yes _X_ No
If answer is "yes," give reasons, month and year activity was completed. Indicate the existing work on the drawings.

7. List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharge or other activities described in this application.

Issuing Agency	Type of Approval	Identification No.	Date of Application	Date of Approval	Date of Denial
See Attached Continuation Sheet					

8. **DESCRIPTION OF THE ACTIVITY (fill in information in the following four blocks - 8a, 8b, 8c & 9)**

8a. Activity: Describe the Overall Activity:
See Attached Continuation Sheet

8b. Purpose: Describe the purpose, need and intended use of the activity:

See Attached Continuation Sheet

8c. Discharge of dredged or fill material: Describe type, quantity of dredged material (in cubic yards), and quantity of fill material (in cubic yards).

See Attached Continuation Sheet

9. Waterbody and location of waterbody or upland where activity exists or is proposed, or location in relation to a stream, lake, wetland, wellhead or water intake (if known). Indicate the distance to, and the name of any receiving stream, if appropriate.

See Attached Continuation Sheet

10. To address the requirements of the Antidegradation Rule, your application must include a report evaluating the:

- Preferred Design (your project) and Mitigative Techniques
- Minimal Degradation Alternative(s) (scaled-down version(s) of your project) and Mitigative Techniques
- Non-Degradation Alternative(s) (project resulting in avoidance of all waters of the state)

At a minimum, item a) below must be completed for the Preferred Design, the Minimal Degradation Alternative(s), and the Non-Degradation Alternative(s), followed by completion of item b) for each alternative, and so on, until all items have been discussed for each alternative (see Primer for specific instructions).

10a) Provide a detailed description of any construction work, fill or other structures to occur or to be placed in or near the surface water. Identify all substances to be discharged, including the cubic yardage of dredged or fill material to be discharged to the surface water.

10b) Describe the magnitude of the proposed lowering of water quality. Include the anticipated impact of the proposed lowering of water quality on aquatic life and wildlife, including threatened and endangered species (include written comments from Ohio Department of Natural Resources and U.S. Fish and Wildlife Service), important commercial or recreational sport fish species, other individual species, and the overall aquatic community structure and function. Include a Corps of Engineers approved wetland delineation.

10c) Include a discussion of the technical feasibility, cost effectiveness, and availability. In addition, the reliability of each alternative shall be addressed (including potential recurring operational and maintenance difficulties that could lead to increased surface water degradation.)

10d) For regional sewage collection and treatment facilities, include a discussion of the technical feasibility, cost effectiveness and availability, and long-range plans outlined in state or local water quality management planning documents and applicable facility planning documents.

10e) To the extent that information is available, list and describe any government and/or privately sponsored conservation projects that exist or may have been formed to specifically target improvement of water quality or enhancement of recreational opportunities on the affected water resource.

10f) Provide an outline of the costs of water pollution controls associated with the proposed activity. This may include the cost of best management practices to be used during construction and operation of the project.

10g) Describe any impacts on human health and the overall quality and value of the water resource.

10h) Describe and provide an estimate of the important social and economic benefits to be realized through this project. Include the number and types of jobs created and tax revenues generated and a brief discussion on the condition of the local economy.

10i) Describe and provide an estimate of the important social and economic benefits that may be lost as a result of this project. Include the effect on commercial and recreational use of the water resource, including effects of lower water quality on recreation, tourism, aesthetics, or other use and enjoyment by humans.

10j) Describe environmental benefits, including water quality, lost and gained as a result of this project. Include the effects on the aquatic life, wildlife, threatened or endangered species.

10k) Describe mitigation techniques proposed (except for the Non-Degradation Alternative):

- Describe proposed Wetland Mitigation (see **OAC 3745-1-54** and Primer)
- Describe proposed Stream, Lake, Pond Mitigation (see Primer)

11. Application is hereby made for a Section 401 Water Quality Certification. I certify that I am familiar with the information contained in this application and, to the best of my knowledge and belief, such information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

Signature of Applicant	Date	Signature of Agent
	3/11/13	

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed.

CONTINUATION SHEET

Application for OEPA Section 401 State Water Quality Certification

SANDUSKY HARBOR
MAINTENANCE DREDGING PROJECT

5. The project is located in Sandusky Harbor, Erie County, Ohio. The latitude/longitude of the dredging activity (near the Harbor Entrance) is 41°29'38"N/081°42'10"W. The latitude/longitude at the center of the open-lake placement area is 41°32'42"N/082°39'09"W.

7. Sandusky Harbor, Ohio Operations and Maintenance, Lake Erie Littoral Drift Nourishment: Environmental Assessment, Finding of No Significant Impact, Public Notice and Section 404(b)(1) Evaluation

- Issuing Agency - U.S. Army Corps of Engineers
- Type of Approval - NEPA Documentation (Record of Decision)
- Date of Application - 1985
- Date of Approval - 1985

Final Environmental Impact Statement (FEIS) for Operation and Maintenance of Sandusky Harbor, Ohio

- Issuing Agency - U.S. Army Corps of Engineers
- Type of Approval - NEPA Documentation (Record of Decision)
- Date of Application - 3 March 1975
- Date of Approval - 18 June 1975

Section 401 Water Quality Certification

- Issuing Agency - OEPA
- Type of approval - Section 401 Water Quality Certification
- Date of Application - 13 December 2010
- Identification No. - Ohio EPA ID No. 103715
- Date of Approval - 1 June 2011

8a. The project will entail the maintenance dredging of sediments from the authorized Federal navigation channels of Sandusky Harbor, Erie County, Ohio. The channels will be dredged to the authorized depth. To ensure that the authorized depth within the dredged channels is maintained throughout the shipping season and to account for dredging tolerance, an additional one foot of overdepth may be removed. Approximately 225,000 cubic yards of sediments will be dredged from the harbor in 2013. The dredging is scheduled to occur between 1 July and 15 March. The project will be accomplished by a contractor of the Federal government. The project is described in further detail in the attached Public Notice.

8b. The purpose of the project is to maintain sufficient water depths for commercial navigation in Sandusky Harbor. This project was congressionally authorized by the 1899, 1902, 1919, 1927, 1935, 1945 and 1960 River and Harbor Acts. Sandusky Harbor is the 100th leading port in the United States and is ranked 24th within the Great Lakes. Coal is the major commodity shipped. Bulk commodities that pass through Sandusky Harbor generate approximately $90M annually in direct revenue which supports over 614 jobs. These jobs generate over $32M per year in personal income. Major stakeholders include Norfolk Southern, Sandusky Dock Corp., George Gradel Co., City of Sandusky, Cedar Point Amusement Park, commercial ferries and private marinas.

8c. Approximately 225,000 cubic yards of sediments will be dredged from the Harbor in 2013. Material in the Sandusky Harbor Federal navigation channels consists primarily of silts and clays, with some fine sands and gravels. Sandusky Harbor sediment data was analyzed in 2013 to specifically evaluate its suitability for open-lake placement in accordance with joint U.S. Environmental Protection Agency (USEPA)/USACE protocols contained in the Great Lakes Dredged Material Testing and Evaluation Manual (1998). The material was sampled, tested and evaluated using a tiered approach pursuant to these protocols and guidelines. Based on this Tiered Evaluation, the USACE has determined that the material proposed to be dredged from the Sandusky Harbor Federal navigation channels meets Federal guidelines and is suitable for open-lake placement. Therefore the material dredged from the Sandusky Harbor channels will be placed into the northwest corner of the eastern half of the existing, authorized open-lake placement area. This site has been used previously by the USACE for the placement of Sandusky Harbor dredged material. Material present in the channels between Stations 265+00 and 220+00 (near junction of the Straight and Moseley Channels) has been determined to be predominantly sand in nature. However, existing project depths in this reach of the harbor are already below authorized project depths and will not be dredged during the FY13 dredging cycle. Therefore, no material to be dredged during this dredging cycle is proposed to be placed at the existing nearshore area near Cedar Point. See enclosures 4 an 5 for the approximate location of dredging within this part of the channel.

9. The dredging portion of the project is located in Sandusky Harbor, which is located at Sandusky Bay on Lake Erie. Sandusky Bay is the receiving water for the dredging activities, and Lake Erie is the receiving water for placement activities.

10. Information required under this item is included in the above noted FEISs and Section 404(b)(1) Evaluation prepared for the project and furnished to OEPA. The following is a summary of the information contained in these documents that apply to this item of the application:

10a. Descriptions.

(1) *Preferred Design Alternative*: This alternative would entail the dredging of an estimated 450,000 cubic yards of material from the harbor with placement of the dredged material at the existing open-lake area. The type of equipment used to complete the maintenance dredging operation would be selected by the contractor performing the work. Dredging would not be performed during Lake Erie storm events. A contractor of the Federal government would

accomplish the project. The project would take about 90 days to complete.

(2) *Non-Degradation Alternative*: This is the "No Action" alternative. No construction or filling of surface waters would occur as a result of this alternative.

(3) *Minimum Degradation Alternative*: This alternative would entail the dredging of an estimated 225,000 cubic yards of dredged material from the Federal navigation channels in 2013, with the placement of the dredged material at the existing open-lake area. The type of equipment used to complete the maintenance dredging operation would be selected by the contractor performing the work. Dredging would not be performed during Lake Erie storm events. This project would take about 60 days to complete.

Note that the Minimum Degradation Alternative estimates dredging 225,000 cubic yards less than the Preferred Design Alternative. The estimated acreage of channel to be dredged under the Preferred Design Alternative and Minimum Degradation Alternatives are 93 and 47 acres, respectively. The Minimum Degradation Alternative would impact an estimated 46 acres less of channel bottom/habitat than that of the Preferred Design Alternative. Note that the actual shoal thickness cannot be determined until just before the dredging begins. In addition, shoal thickness will vary throughout the harbor and greatly depend on weather conditions. Therefore, the above quantities are merely estimates regarding the acreage of Federal navigation channel to be dredged/impacted under either alternative.

10b. Water Quality Impacts.

(1) *Preferred Design Alternative*: The material that would be dredged under this alternative consists of sediments that have deposited in the Federal navigation channels since the last maintenance dredging effort in 2011. These types of sediments are homogenous and residually-contaminated with pollutants that are ubiquitous throughout the Great Lakes. As such, these sediments are similar in chemistry to those present in the Lake Erie environment. This alternative would result in a short-term, negligible lowering of ambient water quality, comparable to that which occurs during Lake Erie storm events. Dredging and placement activities would result in excavation, smothering, and mortality of benthic macroinvertebrates, and the temporary avoidance of work areas during the dredging operation by fish and wildlife species (i.e., mostly waterfowl). Following dredging and placement activities, benthic communities would recolonize the impacted areas, and fish and wildlife would return. The dredging area is industrialized and dredged on a frequent basis, so benthic, fish and wildlife use of the water resource is limited; therefore, impacts in this regard would be minor. No impacts to threatened or endangered species would occur from dredging or placement of dredged material.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, no lowering of water quality would result.

(3) *Minimum Degradation Alternative*: The water quality impacts incurred under this alternative would be similar to those incurred under the Preferred Design Alternative, though to a lesser degree given the reduced dredging area and placement quantity.

10c. Feasibility.

(1) *Preferred Design Alternative*: This alternative is technically feasible, as it involves routine maintenance dredging and dredged material placement in Lake Erie. Equipment is readily available to accomplish this type of work. The Benefit/Cost (B/C) ratio for this alternative with respect to commercial navigation in the harbor is greater than or equal to 1.0. Costs of this project have ranged from $2.50 to $6.37 per cubic yard of dredged material in the past. Although this alternative is viable for commercial navigation, recurrent maintenance dredging needs of the Federal navigation channels, as required, would continue to marginally and temporarily degrade water quality.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, this alternative is technically feasible and available, but would not be cost effective from a commercial navigation standpoint. Under this alternative, the Federal navigation channels would progressively shoal in and impede commercial navigation, which would result in an increased cost of commodities to the local community. Deep-draft commercial navigation in the harbor would become economically nonviable and gradually cease.

(3) *Minimum Degradation Alternative*: This alternative is technically feasible, as it involves routine maintenance dredging and dredged material placement in Lake Erie. Equipment is readily available to accomplish this type of work. The Benefit/Cost (B/C) ratio for this alternative with respect to commercial navigation in the harbor is greater than or equal to 1.0. Costs of this project have ranged from $2.50 to $6.37 per cubic yard of dredged material in the past. Although this alternative is viable for commercial navigation, recurrent maintenance dredging needs of the Federal navigation channels, as required, would continue to marginally and temporarily degrade water quality.

10d. Regional Sewage Collection/Treatment Facilities. N/A.

10e. Water Quality Improvement/Recreation Projects. No information, to our knowledge, is available.

10f. Water Pollution Control Costs.

(1) *Preferred Design Alternative*: Not dredging or placing material during storm events constitutes "blow days," which cost about $10,000 to $20,000 per day of lost work. The decision not to dredge based on weather conditions would be due to safety concerns.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, no costs result from water pollution controls.

(3) *Minimum Degradation Alternative*: Not dredging or placing material during storm events constitutes "blow days," which cost about $10,000 to $20,000 per day of lost work. The decision not to dredge based on weather conditions would be due to safety concerns.

10g. Human Health Impacts.

(1) *Preferred Design Alternative*: The human health impacts associated with this alternative would be indiscernible. The generation of turbidity and lowered dissolved oxygen in the water column would be the major temporary effects associated with dredging and placement activities. The dredging area is within an industrialized water resource designed for commercial navigation. This alternative would result in short-term, minor, negative impacts to the quality and value of the receiving waters.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, no effects to human health would occur.

(3) *Minimum Degradation Alternative*: The human health impacts incurred under this alternative would be similar to those incurred under the Preferred Design Alternative, though to a lesser extent due to the reduction of area to be dredged.

10h. Social/Economic Benefits Gained.

(1) *Preferred Design Alternative*: This alternative would restore navigable depths in the harbor channels for commercial vessel traffic. A large industrial base depends on the harbor to receive commercial goods and ship them off-site for a reasonable cost. As such, it would allow for the cost-effective transport of commodities through the local community. Sandusky Harbor is the 100th leading port in the United States and is ranked 24th among Great Lakes Ports with over 2.3M tons of material shipped or received in 2010. Coal is the major commodity shipped. Bulk commodities that pass through Sandusky Harbor generate approximately $90M annually in direct revenue which supports over 614 jobs. These jobs generate over $32M per year in personal income. Major stakeholders include Norfolk Southern, Sandusky Dock Corp., George Gradel Co., City of Sandusky, Cedar Point Amusement Park, commercial ferries and private marinas. The Sandusky region's economy consists of a diversified industrial base, which includes machine tools, automotive parts, plastics and vinyl products, colorants, paints, bearings and food processing. The county is also the site of Plum Brook Station of N.A.S.A.'s John H. Glenn Research Center, which is known for its space testing facilities. The economy is bolstered by tourism due in great part to the Cedar Point Amusement Park. Agriculture, including wine production, also plays a significant economic role for the region. Noteworthy details about Sandusky, Ohio: estimated median household income in 2007 - $35,000; cost of living index in 2008 - 77.8 (U.S. average is 100); adult population holding a bachelor's degree - 11%.

(2) *Non-Degradation Alternative*: This alternative would involve the cessation of maintenance of harbor Federal navigation channels. However, benefits of the Federal channels would remain to recreational navigation until the channels shoal into a degree at which they would no longer be usable for shallow-draft vessels. Recreational benefits in this regard would include primarily those associated with local marinas and the leisure craft they support.

(3) *Minimum Degradation Alternative*: The social/economic benefits gained under this alternative would be similar to those incurred under the Preferred Design Alternative, though to a lesser extent due to the reduction of area to be dredged.

10i. Social/Economic Benefits Lost.

(1) *Preferred Design Alternative*: Lowered water quality associated with the alternative, such as short-term turbidity and reduced dissolved oxygen levels in the water column, would be aesthetically displeasing and may not be attractive to recreational boaters in the area. Recreational fishing activities may be temporarily negatively affected by the localized lowering of water quality at the dredging and open-lake placement sites. Except for commercial industries such as restaurants and other riparian retail establishments, the lowering of water quality would have minimal negative effects on commercial activities.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, no lowering of water quality would occur. Therefore, negative effects on the recreational use of the harbor would not occur. However, substantial effects on commercial (and eventually recreational) navigation and associated industries would occur as a result of this alternative. The overall value of the harbor as a water resource to commercial navigation would progressively deteriorate to a point at which deep-draft commercial vessels would no longer be able to navigate the harbor due to inadequate depths. The large industrial base that depends on the harbor to transport commodities would no longer be able to do so cost-effectively. The harbor would no longer be a viable alternative for the transportation of goods.
This would have a substantial negative impact on the local economy and on the over 614 jobs that support these commodities. The harbor would no longer effect competitive price levels on local commercial goods. Since the industrial base on the harbor would likely close down, all tax revenues in this regard would be lost. The lack of project construction itself would result in the loss of about 10-15 blue-collar jobs in the dredging industry for a period of about 2-3 months.

(3) *Minimum Degradation Alternative*: The social/economic benefits lost under this alternative would be similar to those incurred under the Preferred Design Alternative, though to a lesser extent due to the reduction of area to be dredged.

10j. Environmental Benefits Lost/Gained.

(1) *Preferred Design Alternative*: This alternative would result in a localized short-term reduction of water quality in the receiving waters. Dredging and placement activities would result in excavation, smothering, and mortality of benthic macroinvertebrates, and temporary avoidance of work areas by fish and wildlife species (i.e., mostly waterfowl). The dredging area is quite industrialized, so benthic, fish and wildlife use of the water resource is limited; therefore, impacts in this regard would be minor. Following dredging and placement activities, benthic communities would recolonize impacted areas, and fish and wildlife would return. No effects to endangered or threatened species would occur.

(2) *Non-Degradation Alternative*: Since this alternative involves no construction or filling of surface waters, associated environmental benefits would include no degradation of water quality in receiving waters, and no physical disturbances to benthos, or fish and wildlife. No effects to endangered or threatened species would occur.

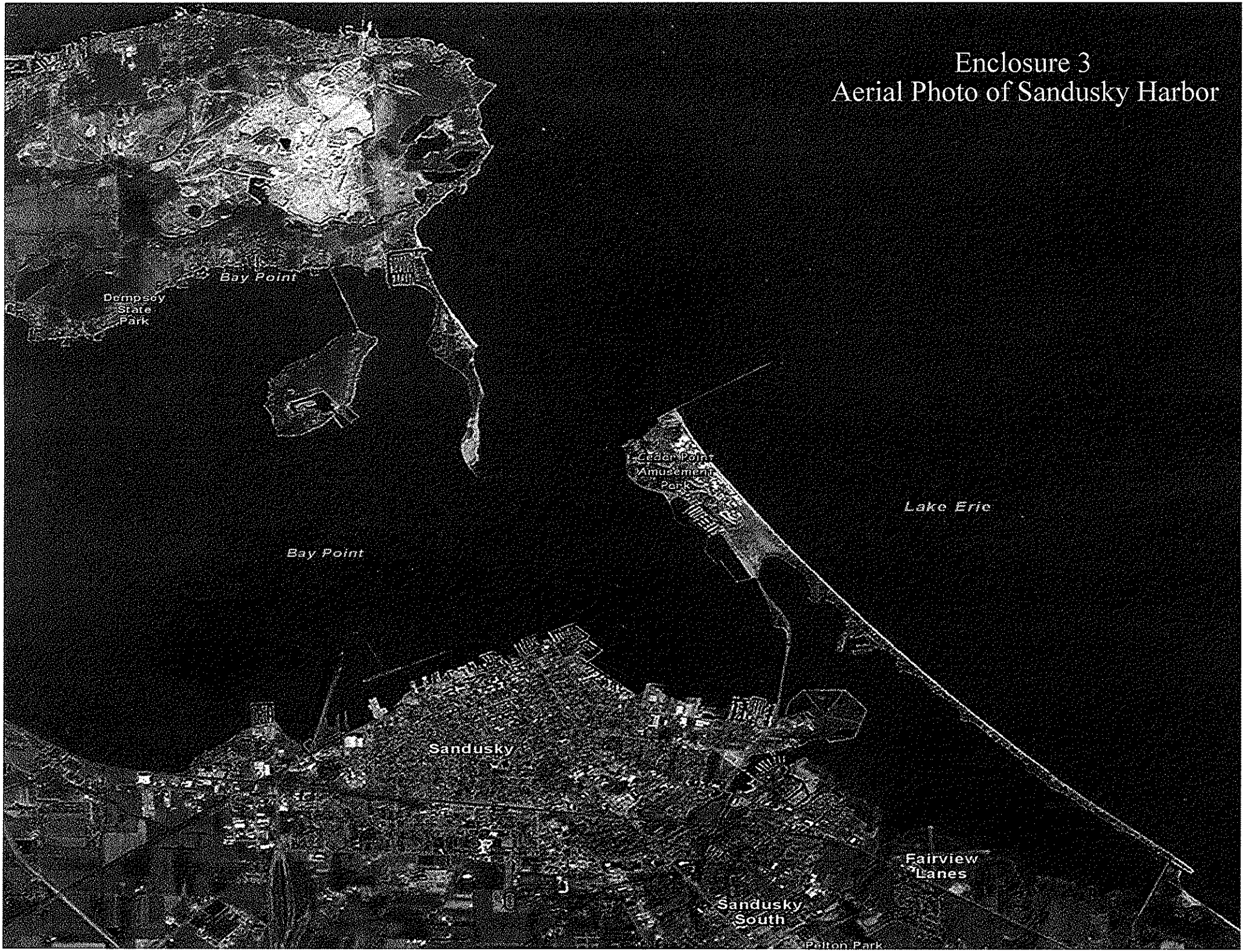
(3) *Minimum Degradation Alternative*: The environmental benefits lost/gained under this alternative would be similar to those incurred under the Preferred Design Alternative, though to a lesser degree given the reduced dredging area and placement quantity.

10k. Mitigative Techniques.

(1) *Preferred Design Alternative:* Dredging would not be performed during Lake Erie storm events. Care would be employed throughout the course of the dredging/placement operations to avoid the creation of unnecessary turbidity that may degrade water quality or adversely affect aquatic life outside the project area.

(2) *Non-Degradation Alternative:* N/A.

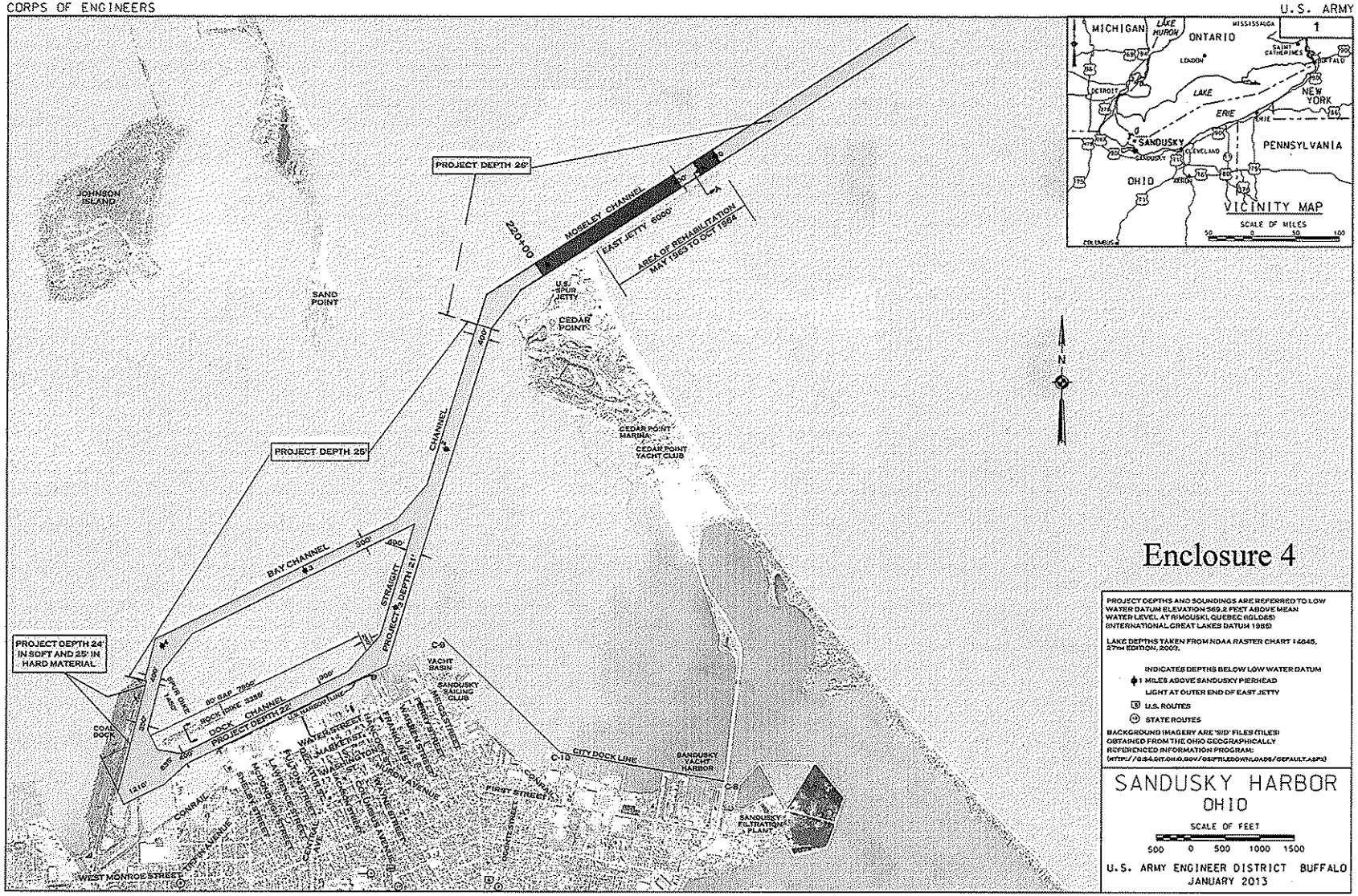
(3) *Minimum Degradation Alternative:* The mitigative techniques used under this alternative are similar to those used under the Preferred Design Alternative. In addition, no in-water work shall take place between March 15 and July 1 to reduce impacts to aquatic species and their habitats.


Enclosure 3
Aerial Photo of Sandusky Harbor
Bay Point
Dempsey
State
Park
Cedar Point
Amusement
Park
Lake Erie
Bay Point
Sandusky
Fairview
Lanes
Sandusky
South
Pelton Park

MINIMUM DEGRADATION ALTERNATIVE
(DREDGE 47 ACRES, LOCATIONS AND EXTENTS WILL BE ADJUSTED BASED UPON ACTUAL SHOALING AND LOCATIONS [redacted])

CORPS OF ENGINEERS

U.S. ARMY



Enclosure 4

PROJECT DEPTHS AND SOUNDINGS ARE REFERRED TO LOW WATER DATUM ELEVATION 569.2 FEET ABOVE MEAN WATER LEVEL AT RIMOUSKI, QUEBEC (IGLD85) (INTERNATIONAL GREAT LAKES DATUM 1985)

LAKE DEPTHS TAKEN FROM NOAA RASTER CHART 14845, 27TH EDITION, 2003.

INDICATES DEPTHS BELOW LOW WATER DATUM

1 MILES ABOVE SANDUSKY PIERHEAD LIGHT AT OUTER END OF EAST JETTY

U.S. ROUTES

STATE ROUTES

BACKGROUND IMAGERY ARE 'SID' FILES (TILES) OBTAINED FROM THE OHIO GEOGRAPHICALLY REFERENCED INFORMATION PROGRAM: (HTTP://GIS1.OIT.OHIO.GOV/OSIP/LEDOWNLOADS/GDFAULT.ASPX)

SANDUSKY HARBOR
OHIO

SCALE OF FEET

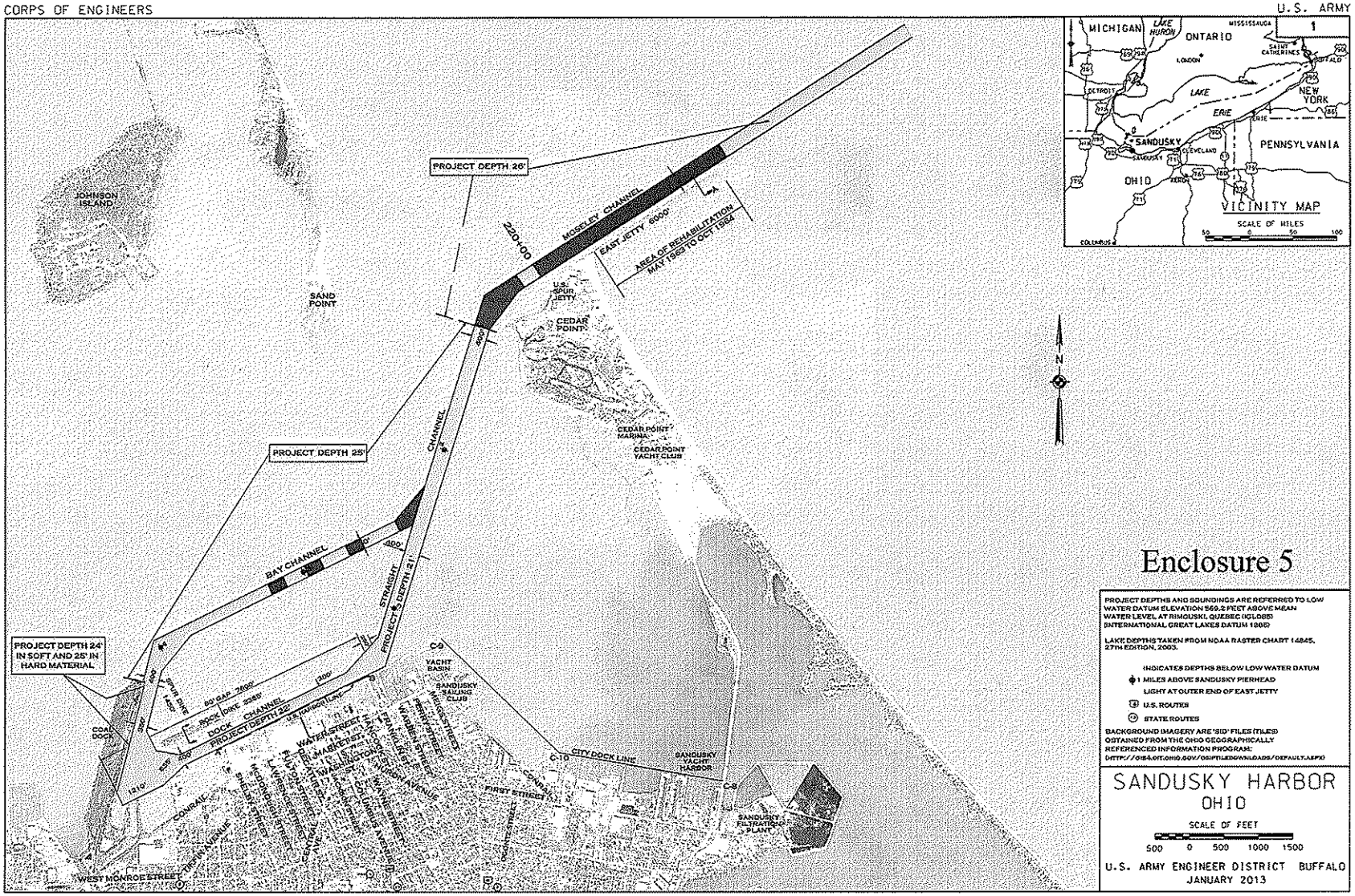
500 0 500 1000 1500

U.S. ARMY ENGINEER DISTRICT BUFFALO
JANUARY 2013

PREFERRED DESIGN ALTERNATIVE
(DREDGE 93 ACRES, LOCATIONS AND EXTENTS WILL BE ADJUSTED BASED UPON ACTUAL SHOALING AND LOCATIONS [redacted])

CORPS OF ENGINEERS

U.S. ARMY



Enclosure 5

US Army Corps
of Engineers®
Buffalo District

EVALUATION OF SANDUSKY HARBOR FEDERAL NAVIGATION CHANNEL SEDIMENTS WITH RESPECT TO THEIR SUITABILITY FOR OPEN-LAKE PLACEMENT

1.0 Introduction

This evaluation serves to update the Tiered Evaluation of Sandusky Harbor Federal navigation channel sediments. It was performed in accordance with guidelines contained in the U.S Environmental Protection Agency (USEPA)/USACE Great Lakes Dredged Material Testing and Evaluation Manual (1998). It is based on sediment data collected in 2005 (Engineering and Environment, Inc. [EEI] 2005) and 2011 (RTI Laboratories, Inc. [RTI] 2011).

2.0 Background and Potential Sources of Sediment Contamination

Traditional contaminants in Sandusky Harbor Federal navigation channel sediments include heavy metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and pesticides. The major source of bottom sediments in the harbor includes sediments from Sandusky Bay and littoral drift along the Lake Erie shoreline. Major sources of pollution to bottom sediments in the harbor include: (1) non-point source agricultural runoff (i.e., phosphorus, nitrogen and pesticides); (2) urban storm water runoff (i.e., heavy metals, oil and PAHs), resulting from commercial and residential development; (3) municipal and effluent industrial point source discharges; (4) combined sewer overflows (CSOs) (i.e., oil, sediment and bacteria); (5) sanitary sewer overflows; and (6) chemical leachate from waste disposal sites.

3.0 Sediment Quality Assessment

This assessment is based on sediment data collected in 2005 (Engineering and Environment, Inc. [EEI] 2005) and 2011 (RTI Laboratories, Inc. [RTI] 2011).

3.1 2005 Sediment Data (EEI 2005)

The 2005 sampling effort entailed the collection of bulk surface grab samples from the Federal navigation channel, which was represented by Sampling Sites SH-1 through SH-11 (Figure 1). One Quality Control (QC) sample was run on the sediment sample from Sampling Site SH-3 in the Dock Channel. Due to unfavorable weather-related lake conditions during sediment sampling in October 2005, open-lake sediment samples were not collected. Consequently, data on

the open-lake reference and disposal area sediments from 2003 were used for this evaluation. The sediment sampling sites relative to the 2003 open-lake reference area (SR-1 through SR-4) and open-lake placement area (SD-1 through SD-2) in Lake Erie are shown in Figure 2. All samples were analyzed for particle size, and bulk inorganics, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides and volatile organics. EEI performed both the 2005 and 2003 sediment analyses.

Our toxicological assessment of 2005 Sandusky Harbor sediments is summarized as follows:

a. Bulk sediment analyses

1. *Physical testing* - Table 1 presents the results of the grain size analyses on the sediment samples. The Federal navigation channel sediments were comprised of a mixture of silts and clays, with some sands. With the exception of one site, the sediment samples were comprised of about 63.1 to 100 percent silts and clays. Sediments from Sampling Site SH-11 in the Moseley Channel were comprised of about 93.7 percent sands. The open-lake reference area sediments were composed of a mixture of silts and clays, with less than about 10.7 percent sands. The open-lake placement area sediments were comprised of a mixture of silts and clays, with about 11 percent sands.

2. *Chemical testing*: Both open-lake reference and placement area sediments were used to represent the lake environs. As such, contaminant concentrations in the harbor channel sediment samples were compared to these areas to determine if they significantly exceeded lake sediment concentrations.

(a) Inorganic analyses - Table 2 presents the results of inorganic analyses on the sediment samples. The contaminant concentrations in the Federal navigation channel sediment samples were compared to those at the open-lake reference area, and the majority of the concentrations were lower. However, many were higher, and are shown in boldface type in the table. Aluminum, calcium and manganese concentrations in many of the sediment samples in the Federal navigation channels sediments were significantly higher when compared to the open-lake reference area, but comparable to those at the open-lake placement area. In addition, the levels of antimony at Sampling Site SH-7 (1.51 mg/kg maximum); barium at Sampling Sites SH-1 through SH-3, SH-6 and SH-9 (93.6 mg/kg maximum); and iron at Sampling Sites SH-1, SH-2 and SH-7 (35,100 mg/kg maximum) were significantly higher than the open-lake reference and placement area levels. Such metal concentrations would not appear to be of significant toxicological concern. Therefore, no inorganic contaminants of concern (COCs) were identified.

(b) Organic analyses

(1) PAHs - Table 3 presents the results of these analyses. Most of the PAH compounds in the Federal navigation channel sediment samples were at non-detectable levels. Many or all of the compounds at Sampling Sites SH-1, SH-5 and SH-11 significantly exceeded those relative to the open-lake reference and placement area sediments. Total PAH concentrations at these sites ranged from 0.66 to 1.6 mg/kg at Sampling Sites SH-5 and SH-11, respectively. Such levels are low, and only about one-third of the total concentrations at these sites were comprised of compounds with higher relative potency values (or toxic equivalency factors [TEFs]) (i.e., ≥0.1). Therefore, such levels should not be of significant toxicological concern. Consequently, no PAH compounds were identified as COCs.

(2) PCBs - Table 4 presents the results of these analyses. PCBs were quantified as Aroclors. All Aroclor levels in the Federal navigation channel sediment samples were non-detectable at laboratory reporting limits (LRLs) ranging from 1.86 to 3.8 µg/kg. PCB Aroclor levels at both the open-lake reference and placement areas were non-detectable at LRLs ranging from 4.1 to 33 µg/kg and 3.8 to 28 µg/kg, respectively. Therefore, no PCBs were identified as COCs.

(3) Pesticides - Table 5 presents the results of these analyses. All pesticide concentrations in the Federal navigation channels sediment samples were non-detectable at LRLs ranging from 0.916 to 1.88 µg/kg. Pesticide levels at both the open-lake reference and placement areas were non-detectable at LRLs ranging from 3.1 71 µg/kg and 2.9 to 59 µg/kg, respectively. Therefore, no pesticides were identified as COCs.

b. Elutriate testing – Tables 6 through 9 present the results of the elutriate testing. The results show low to moderate releases of many of the metals at many of the Federal navigation channel sampling sites, and low releases of phosphorus and ammonia at some of the sites. No releases of any PAH compounds, PCBs or pesticides were evidenced at or above LRLs of 0.2, 0.5 and 0.25 to 1.0 µg/kg, respectively.

3.2 2011 Sediment Data (RTI 2011)

In 2012, 22 surface grab samples were collected from the Federal navigation channels of Sandusky Harbor (Sites SH-1 through SH-12; SPS-1 through SPS-5) (Figure 3), four from the open-lake reference area (Sites SL-1 through SL-4), two from the open-lake placement area (Sites SD-1 and SD-2), and two from the nearshore placement area at Cedar Point (Sites SN-1 and SN-2) as shown in Figure 4. Sediment samples for Sites SH-1 through SH-12, SL-1 through SL-4, SD-1 and SD-2, and SN-1 and SN-2 were subjected to physical analyses including bulk particle size, and analyzed for the following: inorganics including heavy metals, oil and grease, cyanide, ammonia nitrogen, phosphorus, total kjeldahl nitrogen (TKN) and total organic carbon (TOC); and organics including

PAHs, PCBs and pesticides. Sites SPS-1 through SPS-5 were subjected only to bulk particle size and TOC analyses. A SET for the same inorganic and organic contaminants was applied to all of the Federal navigation channel (SH) sediment samples.

Our toxicological assessment of 2011 Sandusky Harbor sediments is summarized as follows:

a. Bulk sediment analyses

1. *Physical testing* - Table 10 presents the results of the grain size analyses performed on the sediment samples. Sediment from the majority of the Federal navigation channel sites, and well as those from the open-lake placement and reference areas were comprised of a predominant mixture of silts and clays (65 to 95 percent), with some sands. The exception to this was Federal navigation channel sediments located around the junction of the Straight and Moseley Channels in the harbor as represented by sites SH-10, SH-11, SPS-2, and SPS-3, as well as those from the nearshore placement area (SN-1 and 2). These sediments were predominated by coarse-grained material ranging from 71 to 92 percent sands. Sediments dredged from this portion of the harbor would likely be suitable for placement at the nearshore placement area in order to return the coarse-grained material to the littoral zone, rather than be placed within the open-lake placement area.

2. *Chemical testing*: As in the evaluation of the previous data set, both open-lake reference and placement area sediments were used to represent the lake environs. As such, contaminant concentrations in the harbor sediment samples were compared to these areas to determine if they significantly exceeded lake sediment concentrations.

(a) Inorganic analyses - Table 11 presents the results of the general chemistry/inorganic analyses on the sediment samples. Oil and grease, ammonia nitrogen, TKN and total phosphorus were detected in the harbor sediments at concentrations slightly higher, but comparable to those found in the open-lake placement and reference areas. None of these concentrations are of toxicological concern. Cyanide was undetected in all of the lake and harbor sediments. Therefore, none of the inorganic compounds were identified as COCs.

Average TOC concentrations in the harbor sediments ranged from 760 mg/kg at site SH-10 to 43,000 mg/kg at site SH-5. In the open-lake reference area, TOC sediment concentrations ranged from 23,000 mg/kg at site SL-2 to 27,000 mg/kg at site SL-2. In the open-lake placement area, TOC concentrations ranged were 32,000 and 53,000 mg/kg respectively at sites SD-1 and 2; and 4,800 and 15,000 mg/kg respectively at sites SN-1 and 2.

(b) Metals – Table 12 presents the results of the metals analyses on the sediment samples. Only concentrations of arsenic (11 mg/kg), barium (160 mg/kg) and beryllium (1.4 mg/kg) at Site SH-5 were higher than those in the open-lake reference and placement area sediments. However, such concentrations are not of significant toxicological concern in comparison to relevant and applicable screening values. Therefore, none of the metals were identified as COCs.

(b) Organic analyses

(1) PAHs - Table 13 presents the results of these analyses. Most of the PAH compounds in the Federal navigation channel sediment samples were at non-detectable levels. Total PAH concentrations at all of the Federal navigation channel sites were less than those found in the open-lake placement and reference area sites. Consequently, no PAH compounds were identified as COCs.

(2) PCBs - Table 14 presents the results of these analyses. PCBs were quantified as Aroclors. All Aroclor levels in the Federal navigation channel sediment samples were non-detectable at laboratory reporting limits (LRLs) ranging from 3.6 to 13 µg/kg. PCB Aroclor levels at both the open-lake reference and placement areas were also non-detectable at LRLs ranging from 9.2 to 15 µg/kg and 6.3 to 10 µg/kg, respectively. Therefore, no PCBs were identified as COCs.

(3) Pesticides - Table 15 presents the results of these analyses. The only detectable concentrations of pesticides were delta-BHC (1.9 µg/kg) and methoxychlor (8.5 µg/kg) at Site SH-5. Such concentrations are not of significant toxicological concern in comparison to relevant and applicable screening values. No other pesticides were detected in either Federal navigation channel or lake reference/placement area sediments at LRLs ranging from 0.49 to17 µg/kg. Therefore, no pesticides were identified as COCs.

b. Elutriate testing – Tables 16 through 20 present the results of the site water and standard elutriate testing conducted on the Federal navigation channel sediments. The results show low releases of many of the inorganics and metals at nearly all of the Federal navigation channel sampling sites. None of these releases would exceed any relevant, promulgated water quality standards and in most cases are comparable to ambient background concentration found in the Lake Erie site water. No releases of any PAH compounds, PCBs or pesticides were evidenced at or above LRLs of 0.0022 to 0.33 µg/L.

4.0 Final COC List

No analytes were determined to be at levels such that they would be considered COCs in either the 2005 or 2011 data sets. Therefore at this time there are no

COCs in Sandusky Harbor Federal navigation channels based on existing sediment quality data.

5.0 Quality Assurance (QA)/Quality Control (QC) Documentation

QA/QC information and records on the data contained in this evaluation are available in EEI (2005) and RTI (2011).

6.0 Conclusion

This evaluation has determined that:

a. All material to be dredged from the Sandusky Harbor Federal navigation channels meets Federal guidelines, and therefore has been determined to be suitable for open-lake placement.

7.0 References

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Ohio EPA. 2003. Guidance for Conducting Ecological Risk Assessments. DERR-00-RR-031.

RTI. 2011. Level IV Data Package. RTI Work Order 1109839. Project: Sandusky Harbor. Report prepared under contract for USACE, Buffalo District.

USEPA and USACE. 1998. Great Lakes Dredged Material Testing and Evaluation Manual. http://www.epa.gov/glnpo/sediment/gltem/manual.htm

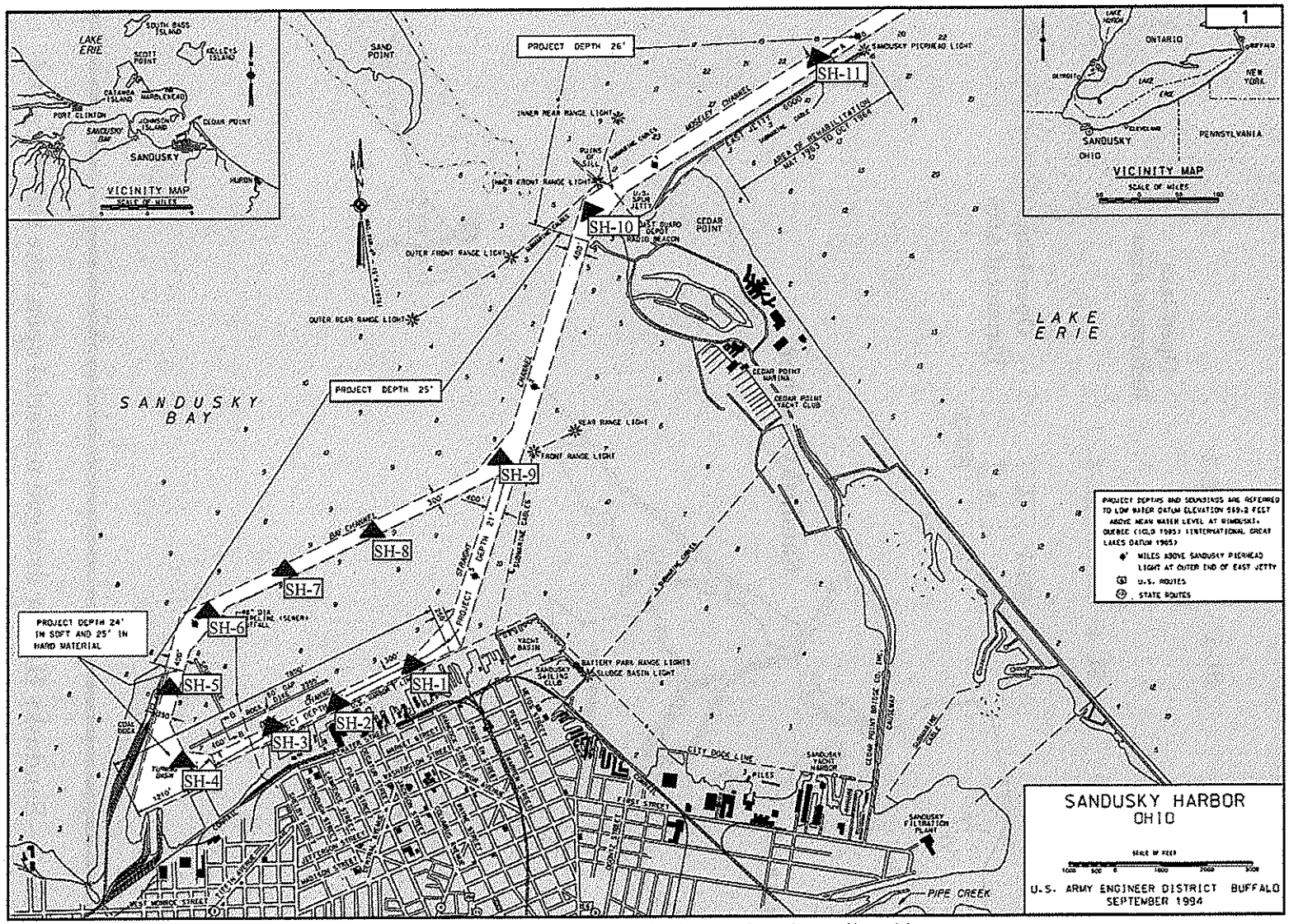

Figure 1 – 2005 Sandusky Harbor Sampling Sites.

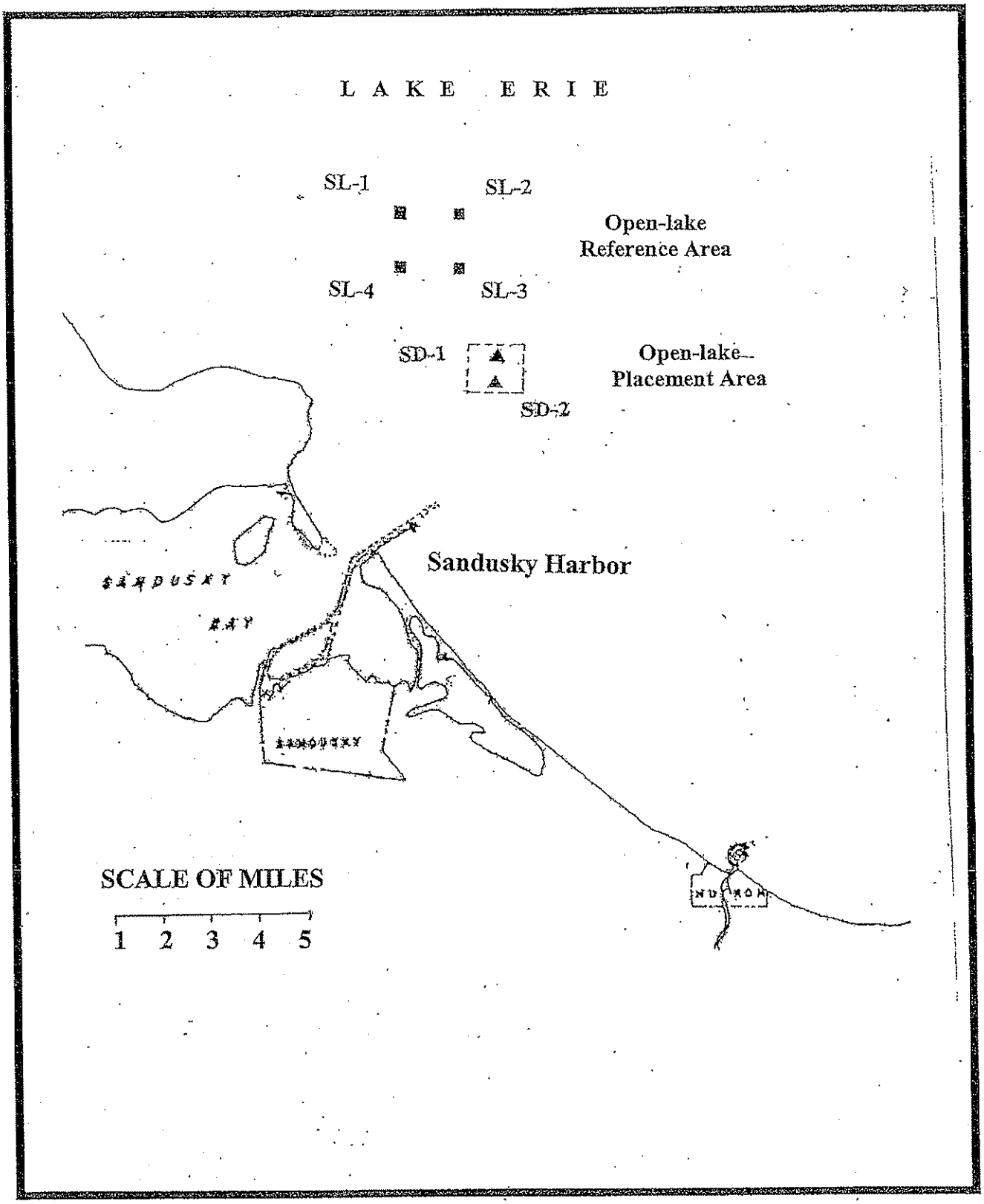

Figure 2 – Sandusky Harbor dredged material open-lake reference and placement areas.

Table 1. Particle size distribution of Sandusky Harbor sediments (from EEI 2005).

	Harbor Sediments										
	Sampling Sites										
Particle Size	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
Gravel	0	0	0	0	0	0	0	0	0	0	0
Sand	0	0.4	0.6	36.9	8.1	0.3	4.6	4.8	23.8	33.90	93.7
Silt	59.0	53.8	58.1	27.6	41.4	60.5	53.9	56.2	49.0	41.4	2.1
Clay	41.0	45.8	41.3	35.5	50.5	39.2	41.5	39.0	27.2	24.7	4.2

Open Lake Area Sediments					
Reference Sampling Sites				Disposal Sampling Sites	
SR-1	SR-2	SR-3	SR-4	SD-1	SD-2
0	0	0	0	0	0
10.7	10.0	5.2	0	11.0	11.0
52.0	55.0	61.8	62.0	50.0	49.0
37.3	35.0	33.0	38.0	39.0	40.0

Table 2. Bulk inorganic analyses on Sandusky Harbor sediments. Boldface values indicate a concentration that is greater in comparison to the open-lake reference area (from EEI 2005).

	Harbor Sediments											Open Lake Area Sediments					
	Sampling Sites											Reference Sampling Sites				Disposal Sampling Sites	
Metals (mg/kg)	**SH-1**	**SH-2**	**SH-3**	**SH-4**	**SH-5**	**SH-6**	**SH-7**	**SH-8**	**SH-9**	**SH-10**	**SH-11**	**SR-1**	**SR-2**	**SR-3**	**SR-4**	**SD-1**	**SD-2**
Aluminum	**20400**	**22400**	**19300**	8910	**16000**	**19600**	**21100**	**15600**	**19400**	2390	**11600**	9570	11200	11100	11100	11400	14500
Antimony	**1.11**	**1.32**	**1.15**	0.557	**0.956**	**1.14**	**1.51**	**0.99**	**1.06**	0.205	0.799	0.39	0.8	0.44	0.57	0.63	0.57
Arsenic	**6.59**	**6.79**	**6.58**	5.1	**5.58**	**6.49**	**7.94**	**5.84**	**7.26**	3.42	**7.05**	3.4	3.9	4.4	3.6	4.6	5.8
Barium	**89.6**	**93.6**	**84.9**	40	**61.1**	**86.5**	**90.3**	**71.7**	**83.8**	14.3	56	46.5	56.8	56.5	56.5	60.6	84.2
Beryllium	**0.728**	**0.772**	**0.707**	0.375	0.535	**0.696**	**0.74**	0.589	**0.693**	0.131	0.489	0.52	0.61	0.62	0.59	0.62	0.75
Cadmium	0.672	0.677	0.667	0.257	0.406	0.561	0.748	0.545	0.57	0.0939	0.589	0.95	1.2	1.4	0.99	1.4	0.9
Calcium	**44400**	**42000**	**42200**	**57400**	**32800**	**48700**	**47200**	**38500**	**44400**	**46700**	**46300**	20300	20900	21400	18700	12900	55900
Chromium	23.1	24.4	22.8	10.6	16.2	21.3	23.3	18.4	20.9	3.25	15.4	20.3	25.7	28.9	22.8	28.1	24.3
Cobalt	**9.11**	**9.58**	**8.67**	4.82	6.49	**8.66**	**9.56**	7.61	**8.64**	2.55	7.6	7.3	8.3	8.2	7.8	6.9	11.4
Copper	**38.3**	**40.7**	**37.3**	19.9	27.8	**34**	**35.7**	27	**29.9**	8.89	23.8	19.9	26.2	28.2	22.1	30.3	30.5
Iron	**32600**	**35000**	**31000**	16400	**27100**	**30900**	**35100**	**25800**	**30500**	7230	**20700**	17300	19600	19300	18500	17300	23900
Lead	20.8	22.4	22.3	10.6	16.3	19	21.9	16.7	18.6	3.87	15.4	19.8	25.5	28.4	21.6	27.8	16.3
Magnesium	9450	10200	9140	**15700**	8230	9380	11700	8790	9290	5690	9400	12800	13400	13600	12200	7640	15300
Manganese	**541**	**512**	**520**	336	**566**	**558**	**676**	**547**	**562**	171	**477**	315	349	361	297	333	638
Mercury	0.121	0.136	0.168	0.0843	0.157	0.174	0.169	0.129	0.0851	0.00996	0.101	0.19	0.11	0.2	0.11	0.21	0.069
Nickel	29.3	**31.1**	28.6	15.1	21	27.7	**30.6**	23.9	27.3	5.87	22	23.1	27.9	30.2	25.1	27.9	32.3
Potassium	**2260**	**2340**	**2140**	1040	1400	**2080**	**2090**	1740	**2040**	296	1410	1730	2030	2010	2000	1970	2810
Selenium	0.405	0.477	0.427	0.282	0.568	0.447	0.475	0.311	0.353	0.104	0.373	0.76	0.7	0.64	0.88	0.98	0.79
Silver	0.195	0.218	0.233	0.189	0.289	0.186	0.209	0.145	0.145	0.0192	0.125	<0.3	0.18	0.14	<0.29	0.25	<0.29
Sodium	109	113	127	78.3	67.6	105	103	87.3	124	166	120	202	218	193	208	155	242
Thallium	0.295	0.316	0.321	0.209	0.268	0.299	**0.337**	0.259	0.252	0.0421	0.222	<0.21	0.33	<0.22	<0.19	0.39	<0.19
Vanadium	**28**	**29.3**	**27**	12.8	18.6	**26.8**	**27.8**	22.3	**26.3**	4.98	18.6	22.3	25.8	25.3	25.3	23.8	31.6
Zinc	**107**	**113**	**104**	50.3	76.2	96.7	**105**	81.9	94.3	21.4	73.9	74.9	93.2	99.2	79.8	101	78

Misc	**SH-1**	**SH-2**	**SH-3**	**SH-4**	**SH-5**	**SH-6**	**SH-7**	**SH-8**	**SH-9**	**SH-10**	**SH-11**	**SR-1**	**SR-2**	**SR-3**	**SR-4**	**SD-1**	**SD-2**
Ammonia (mg/kg)	**216**	**180**	**210**	**211**	**541**	**269**	**277**	**268**	**139**	27.4	**160**	13	20	41	25	31	26
Phosphorus (mg/kg)	**938**	**864**	577	667	**1056**	381	**846**	309	554	201	513	670	680	580	400	380	320
TOC (mg/kg)	29700	33900	37400	**76500**	**76600**	35000	34500	27300	34800	12600	32400	28000	39000	35000	27000	40000	24000
Cyanide (µg/kg)	<800*	<736	<839	<692	<671	<749	<644	<685	<525	<317	<518	N/A	N/A	N/A	N/A	N/A	N/A
Oil & Grease (mg/kg)	202	188	83.5	160	252	151	BQL	201	93.1	131	74.8	490	<520	<530	<460	<440	<420

*Not detected at or above the specified laboratory reporting limit

Table 3. Bulk Polycyclic Aromatic Hydrocarbon (PAHs) analyses on Sandusky Harbor sediments. Boldface values indicate a concentration that is greater in comparison to the open-lake reference area (from EEI 2005).

	Harbor Sediments											Open Lake Area Sediments					
	Sampling Sites											Reference Sampling Sites				Disposal Sampling Sites	
PAHs (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SR-1	SR-2	SR-3	SR-4	SD-1	SD-2
Acenaphthene	**<7.41***	**<15.4**	**<8.36**	<5.34	**<15.9**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**10.8**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Acenaphthylene	**8.86**	**<15.4**	**<8.36**	<5.34	**<15.9**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**20.8**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Anthracene	**12.7**	**<15.4**	**<8.36**	<5.34	**<15.9**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**45.3**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Benzo(a)Anthracene	**42**	**28.2**	22.1	8.21	**40.2**	<15.3	19.2	<14.8	<7.17	<3.98	**140**	15	19	28	11	26	19
Benzo(a)Pyrene	**52.9**	**36.8**	25	9.37	**49.2**	<15.3	20.3	<14.8	<7.17	<3.98	**128**	15	18	28	14	26	20
Benzo(b)Fluoranthene	**76.8**	**49.7**	36.1	14.4	**73.8**	17.8	28	25.4	9.07	<3.98	**170**	27	27	38	19	33	29
Benzo(g,h,i)Perylene	**42.1**	**22.6**	**18.5**	7.9	**34.1**	<15.3	<16.5	<14.8	<7.17	<3.98	**85.4**	13	13	17	7.4	15	16
Benzo(k)Fluoranthene	**29.8**	**22.4**	10.5	5.75	**28.7**	<15.3	**<16.5**	<14.8	<7.17	<3.98	**64.1**	<6.3	12	16	6.8	21	18
Chrysene	**55.9**	**37.4**	26.8	11	**54.1**	<15.3	23	19.3	<7.17	<3.98	**138**	20	20	35	17	26	30
Dibenzo(a,h)Anthracene	**8.72**	**<15.4**	**<8.36**	<5.34	**<15.9**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**20.2**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Fluoranthene	**97.7**	**64.9**	43.4	19.2	**101**	27.7	40	34.9	11.5	<3.98	**299**	35	42	54	26	46	37
Fluorene	**<7.41**	**<15.4**	**<8.36**	<5.34	**<15.9**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**21.1**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Indeno(1,2,3-c,d)Pyrene	**39.1**	**17.4**	**15.8**	6.7	**25.2**	**<15.3**	**<16.5**	**<14.8**	<7.17	<3.98	**91**	10	11	14	6.8	14	11
Naphthalene	**10.3**	**<15.4**	**<8.36**	7.05	**50.4**	**<15.3**	**<16.5**	**<14.8**	**<7.17**	<3.98	**12.4**	<6.3	<7	<7.1	<6.2	<5.9	<5.7
Phenanthrene	**38.4**	**24.9**	18.8	12.8	**58.5**	<15.3	<16.5	<14.8	<7.17	<3.98	**149**	11	13	23	8.6	17	17
Pyrene	**89**	61.2	40.6	17	**82.3**	25.8	42.2	31	9.84	<3.98	**238**	32	41	69	27	51	52
Total**	631.8	457.9	307.8	146.1	677	270.2	337.7	288.2	123.6	63.68	1633	222.1	258	364.6	180.8	310.4	283.2

*Not detected at or above the specified laboratory reporting limit

**For summing purposes, undetected concentrations valued at specified laboratory reporting limit

Table 4. Bulk Polychlorinated Biphenyl (PCBs) analyses on Sandusky Harbor sediments. Boldface values indicate a concentration that is greater in comparison to the open-lake reference area (from EEI 2005).

	Harbor Sedimants										
	Sampling Sites										
PCBs (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
PCB-1016	<3.32*	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1221	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1232	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1242	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1248	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1254	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1260	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87
PCB-1262	<3.32	<3.54	<3.73	<2.52	<3.6	<3.61	<3.8	<3.4	<3.18	<1.86	<2.87

Open Lake Area Sediments					
Reference Sampling Sites				Disposal SamplingSites	
SR-1	SR-2	SR-3	SR-4	SD-1	SD-2
<8	<8.8	<8.9	<7.8	<7.4	<7.2
<30	<33	<33	<29	<28	<27
<19	<21	<21	<18	<18	<17
<8.7	<9.7	<9.8	<8.5	<8.1	<7.9
<13	<15	<15	<13	<12	<12
<14	<15	<15	<13	<13	<12
<4.2	<4.6	<4.7	<4.1	<3.9	<3.8
N/A	N/A	N/A	N/A	N/A	N/A

*Not detected at or above the specified laboratory reporting limit

Table 5. Bulk pesticide analyses on Sandusky Harbor sediments. Boldface values indicate a concentration that is greater in comparison to the open-lake reference area. (from EEI 2005).

	Harbor Sediments											Open Lake Area Sediments					
	Sampling Sites											Reference Sampling Sites				Disposal Sampling Sites	
Pesticides (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SR-1	SR-2	SR-3	SR-4	SD-1	SD-2
Alpha-BHC	<1.63*	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Beta-BHC	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Delta-BHC	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Gamma-BHC	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Heptachlor	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Aldrin	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Heptachlor Epoxide	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endosulfan I	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Dieldrin	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
4,4'-DDT	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
4,4'-DDE	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
DDD	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endrin	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endosulfan II	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Methoxychlor	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Toxaphene	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<63	<70	<71	<62	<59	<57
Alpha-Chlordane	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Gamma-Chlordane	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endrin aldehyde	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endosulfan sulfate	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9
Endrin ketone	<1.63	<1.80	<1.86	<1.28	<1.79	<1.79	<1.88	<1.74	<1.63	<0.916	<1.42	<3.2	<3.5	<3.5	<3.1	<3	<2.9

*Not detected at or above the specified laboratory reporting limit

Table 6. Inorganic elutriate test results on Sandusky Harbor sediments (from EEI 2005).

	Harbor Sediments										
	Sampling Sites										
Metals (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
Aluminum	0.0349	0.0862	0.0721	0.0618	<0.00363*	0.105	<0.00363	0.00866	0.0125	0.141	0.806
Antimony	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126	<0.000126
Arsenic	0.00906	0.00865	0.0118	0.0103	0.00479	0.011	0.00395	0.00603	0.00576	0.00571	0.00612
Barium	0.0228	0.0251	0.0222	0.0235	0.0357	0.0216	0.0236	0.0224	0.0241	0.0249	0.0296
Beryllium	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240	<0.000240
Cadmium	0.00073	0.00048	0.00048	<0.000170	0.00036	0.00049	<0.000170	0.00049	0.00025	0.00055	0.00036
Calcium	32	32.6	32.1	32	42.3	33.8	30.3	31.5	29.1	31.9	35
Chromium	0.00056	0.00075	0.00146	0.00096	0.00104	<0.000310	<0.000310	0.00139	0.00037	<0.000310	0.0017
Cobalt	0.00065	0.00045	<0.000440	<0.000440	<0.000440	0.00064	<0.000440	<0.000440	0.0087	<0.000440	0.00109
Copper	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640	<0.000640
Iron	0.0386	0.116	0.0692	0.104	0.032	0.088	0.0096	0.00762	0.0147	0.222	<0.00597
Lead	<0.00121	<0.00121	<0.00121	<0.00121	<0.00121	<0.00121	<0.00121	0.00127	0.00204	<0.00121	<0.00121
Magnesium	8.17	7.99	7.58	7.91	11	8.57	7.11	7.41	7.1	7.82	8.03
Manganese	0.616	0.527	0.539	0.61	0.651	0.4	0.125	0.269	0.0902	0.00554	0.666
Mercury	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017	0.000063	<0.000017	<0.000017
Nickel	0.00082	0.00245	<0.000540	0.00188	0.00142	0.00218	0.00215	0.00077	0.00217	0.00169	0.00163
Potassium	2.01	2.34	2.11	2.27	3.62	2.16	2.2	2.02	2.5	1.92	2.64
Selenium	<0.000974	<0.000974	<0.000975	<0.000975	<0.000975	<0.000975	<0.000975	<0.000975	<0.000975	<0.000975	<0.000975
Silver	0.00048	<0.000400	<0.000400	<0.000400	<0.000400	0.00078	<0.000400	0.00048	<0.000400	<0.000400	<0.000400
Sodium	9.42	8.89	10.8	8.31	8.78	8.87	8.48	8.41	8.89	7.84	8.39
Thallium	0.00535	0.0067	0.00282	0.00173	0.00113	0.00034	0.00028	0.00022	0.00015	<0.000127	<0.000127
Vanadium	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117	<0.00117
Zinc	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152	<0.00152

Misc	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
Phosphorus	<0.02	0.1	0.1	<0.02	<0.02	0.04	<0.02	<0.02	0.05	0.04	<0.02
Ammonia	2.09	2.9	1.96	3.82	14.3	2.33	3.49	2.25	3.81	1.38	5.63
Petroleum Hydocarbons	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.111	<0.10	<0.11
Cyanide	<5.00	<5.00	<5.00	2.74	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00

*Not detected at or above the specified laboratory reporting limit

Table 7. PAH Elutriate test results on Sandusky Harbor sediments (from EEI 2005).

	Harbor Sediments										
	Sampling Sites										
PAHs (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
Acenaphthene	<0.200*	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Acenaphthylene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Anthracene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Benzo(a)Anthracene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Benzo(a)Pyrene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Benzo(b)Fluoranthene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Benzo(g,h,i)Perylene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Benzo(k)Fluoranthene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Chrysene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Dibenzo(a,h)Anthracene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Fluoranthene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Fluorene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Indeno(1,2,3-c,d)Pyrene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Naphthalene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Phenanthrene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Pyrene	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200

*Not detected at or above the specified laboratory reporting limit

Table 8. PCB elutriate test results on Sandusky Harbor sediments (from EEI 2005).

	Harbor Sediments										
	Sampling Sites										
PCBs (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
PCB-1016	<0.500*	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1221	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1232	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1242	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1248	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1254	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1260	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
PCB-1262	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500

*Not detected at or above the specified laboratory reporting limit

Table 9. Pesticide elutriate test results on Sandusky Harbor sediments (from EEI 2005).

	Harbor Sediments										
	Sampling Sites										
Pesticides (µg/kg)	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11
Alpha-BHC	<0.250*	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Beta-BHC	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Delta-BHC	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Gamma-BHC	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Heptachlor	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Aldrin	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Heptachlor Epoxide	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endosulfan I	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Dieldrin	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
4,4'-DDE	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endrin	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
DDD	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endosulfan II	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
4,4'-DDT	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Methoxychlor	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Toxaphene	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Alpha-Chlordane	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Gamma-Chlordane	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endrin aldehyde	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endosulfan sulfate	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Endrin ketone	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250

*Not detected at or above the specified laboratory reporting limit

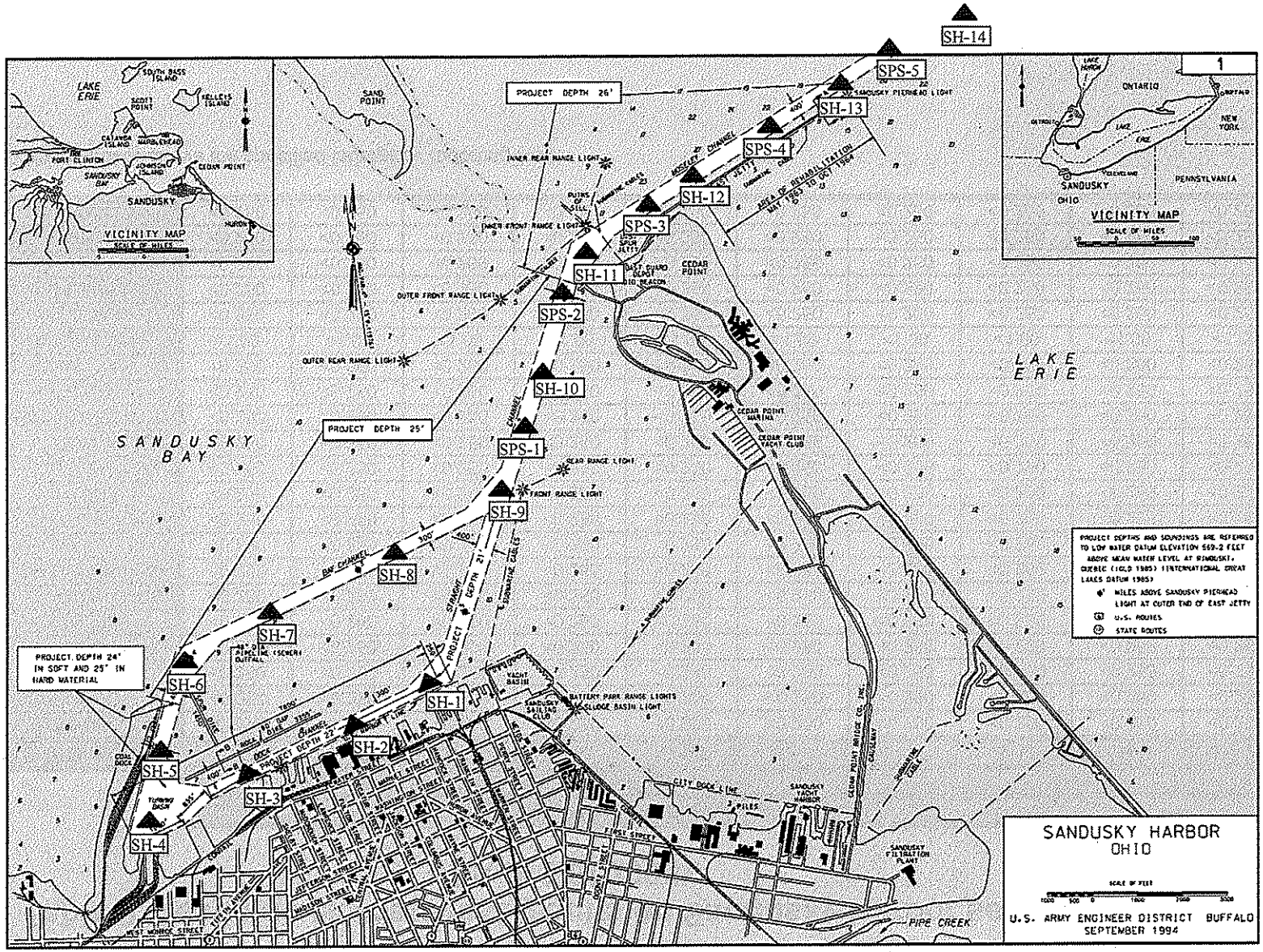

Figure 3 – 2011 Sandusky Harbor Sampling Sites.

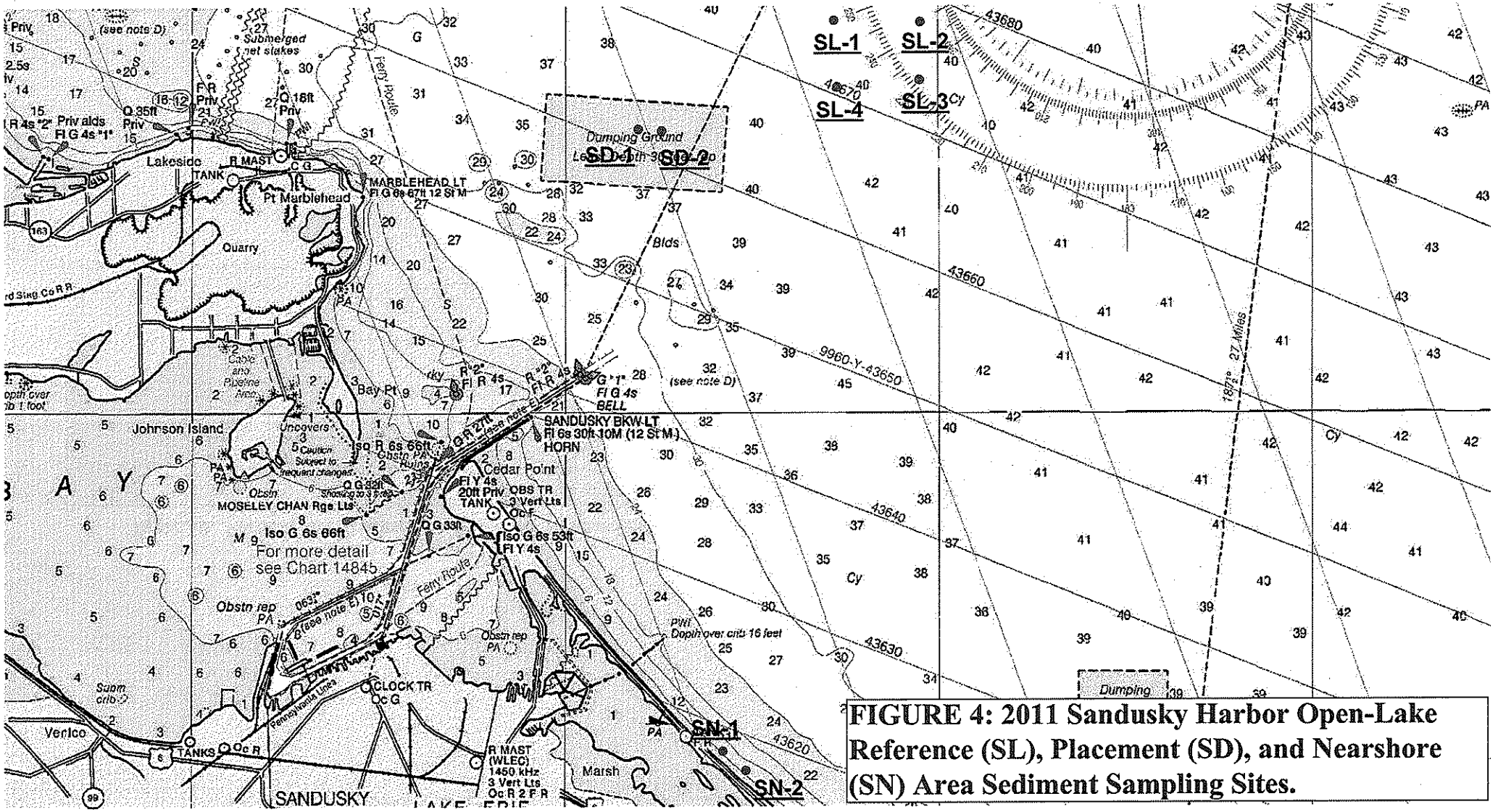

FIGURE 4: 2011 Sandusky Harbor Open-Lake Reference (SL), Placement (SD), and Nearshore (SN) Area Sediment Sampling Sites.

Table 10. Particle size analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (TTL and RTI, 2011).

Particle Size Distribution (%)	Lake Erie Sites								Sandusky Harbor Federal Navigation Channel Sites																						
	Reference Area Sites (SL)				Lake Placement Area Sites (SD)		Nearshore Placement Area Sites (SN)		Dock Channel (including Deep Water Marina [DWM] Sites)						Bay Channel (including Turning Basin)					Straight Channel				Moseley Channel						
	SL-1	SL-2	SL-3	SL-4	SD-1	SD-2	SN-1	SN-2	SH-1	SH-2	DWM-1	DWM-2	DWM-3	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SPS-1	SH-10	SPS-2	SH-11	SPS-3	SH-12	SPS-4	SH-13	SPS-5	SH-14
Clay	41	41	44	51	48	48	3	3	48	48	48	43	48	45	48	41	28	36	45	24	20	3	2	8	5	38	35	34	43	33
Silt	49	48	40	40	47	45	6	5	40	40	45	43	43	40	39	45	35	34	43	42	43	7	4	21	15	40	43	33	33	32
Fine Sand	5	5	9	7	3	6	75	90	8	4	5	9	7	7	5	7	6	5	9	32	30	85	37	64	77	17	18	27	21	32
Meduim Sand	5	6	7	2	2	1	16	2	4	8	2	5	2	8	8	7	10	2	3	2	7	5	37	7	3	5	4	6	3	3
Coarse Sand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	23	0	0	0	0	10	0	0	0	0	0	0	0
Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0
Total Sand and Gravel	10	11	16	9	5	7	91	92	12	12	7	14	9	15	13	14	37	30	12	34	37	90	94	71	80	22	22	33	24	35
Total Fines (Silt and Clay)	90	89	84	91	95	93	9	8	88	88	93	86	91	85	87	86	63	70	88	66	63	10	6	29	20	78	78	67	76	65
Percent Moisture	71	71	71	68	56	54	23	21	64	68	69	69	67	67	68	68	68	64	63	54	45	19	16	36	24	58	63	52	45	50
Total Organic Carbon (mg/kg)*	24,000	23,000	27,000	26,000	32,000	53,000	4,800	15,000	28,000	33,000	34,000	29,000	37,000	30,000	30,000	43,000	29,000	23,000	25,000	23,000	13,000	760	2,500	7,700	5,800	25,000	47,000	29,000	12,000	16,000

*Holding time was exceeded for all total organic carbon samples.
Indicates sediment is candidate for nearshore placement.

Table 11: Bulk inorganic analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (RTI, 2011).

Inorganic Parameter - mg/kg (ppm)	Lake Erie Sites								Sandusky Harbor Federal Navigation Channel Sites													
	Reference Area Sites (SL)				Lake Placement Area Sites (SD)		Nearshore Placement Area Sites (SN)		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites			
	SL-1	SL-2	SL-3	SL-4	SD-1	SD-2	SN-1	SN-2	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
Nitrogen, Ammonia	240	220	310	210	640	660	49	83	240	250	280	510	390	330	260	240	150	74	78	360	210	160
Nitrogen, Total Kjeldahl	3,000	2,900	2,800	3,100	3,500	3,500	210	180	3,600	3,600	3,600	3,900	3,100	3,500	3,200	2,900	2,000	170	910	2,600	2,300	2,200
Phosphorus, Total (as P)	410	390	430	410	250	320	9.7	81	430	360	410	560	640	390	420	330	240	91	170	450	380	290
Cyanide, Total	1.1 U	1.1 U	1.1 U	1.0 U	0.75 U	0.71 U	0.43 U	0.41 U	0.91 U	1.0 U	0.99 U	1.0 U	1.0 U	1.0 U	0.91 U	0.89 U	0.71 U	0.4 U	0.51 U	0.78 U	0.68 U	0.66 U
Total Organic Carbon	24,000 H	23,000 H	27,000 H	26,000 H	32,000 H	53,000 H	4,800 H	15,000 H	28,000 H	33,000 H	30,000 H	30,000 H	43,000 H	29,000 H	23,000 H	25,000 H	23,000 H	760 JH	7,700 H	25,000 H	29,000 H	16,000 H
Oil and Grease, Total	900	1,200	350 U	980	890	440	130 U	130 U	300	720	1,700	1,200	820	720	680	380	530	120 U	220	240	640	590

Note: Results are reported as dry weight. Positive detections are presented in bold.

U = indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

H = indicates holding time was exceeded prior to analysis.

Table 12: Bulk metals analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (RTI, 2011).

Metal - mg/kg (ppm)	Lake Erie Sites								Sandusky Harbor Federal Navigation Channel Sites															
	Reference Area Sites (SL)				Lake Placement Area Sites (SD)		Nearshore Placement Area Sites (SN)		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites					
	SL-1	SL-2	SL-3	SL-4	SD-1	SD-2	SN-1	SN-2	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14		
Aluminum	23,000	23,000	23,000	21,000	23,000	20,000	2,900	2,000	20,000	23,000	22,000	21,000	22,000	20,000	15,000	18,000	12,000	1,600	5,700	17,000	12,000	12,000		
Arsenic	7.3	6.8	6.6	6.6	9.8	9.0	2.4	1.8	7.8	7.7	7.2	9.5	11.0	9.4	9.1	8.6	4.9	1.4	3.7	8.1	8.2	4.7		
Barium	130	140	130	120	130	120	13	8.8	120	130	120	140	160	150	120	120	69	8.7	35	110	72	69		
Beryllium	1.2 J	1.2 J	1.1 J	1.1 J	1.1 J	0.99 J	0.27 U	0.3 U	0.96 J	0.98 J	1.0 J	1.1 J	1.4 J	1.2 J	0.93 J	0.83 J	0.62 J	0.25 U	0.32 U	0.79 J	0.66 J	0.57 J		
Cadmium	2.6	2.6	2.6	2.4	1.3	1.2	0.24 J	0.14 J	1.1	1.2	1.1	1.4	1.5	1.3	1.1	1.1	0.72	0.13 J	0.44 J	0.96	0.96	0.77		
Calcium	19,000	21,000	20,000	22,000	46,000	50,000	19,000	12,000	35,000	45,000	47,000	35,000	41,000	42,000	42,000	42,000	31,000	4,300	15,000	32,000	38,000	26,000		
Chromium	56	60	57	51	32	30	5.8	3.7	28	31	30	33	36	34	27	26	17	2.8	10	26	19	19		
Cobalt	16	17	15	14	14	13	4.9	3.8	13	13	13	14	15	15	12	12	8.4	2.0	4.9	12	10	9.0		
Copper	57	60	57	53	45	45	3.2	2.1	35	42	40	46	49	44	35	31	20	2.2	12	31	26	23		
Iron	41,000	41,000	42,000	38,000	40,000	34,000	9,200	6,800	34,000	39,000	38,000	35,000	38,000	34,000	26,000	33,000	22,000	3,600	11,000	29,000	24,000	23,000		
Lead	61	63	61	56	32	30	5.8	4.0	27	30	29	33	34	30	26	24	16	2.5	9.3	24	20	19		
Magnesium	13,000	14,000	13,000	13,000	9,000	9,100	7,600	4,100	7,400	8,400	8,700	6,800	8,500	8,200	8,600	8,800	6,900	1,100	3,900	7,400	9,300	7,900		
Manganese	690	670	710	710	750	620	230	150	560	630	610	560	590	580	460	650	470	70	330	530	600	430		
Nickel	63	66	62	56	44	41	11	8.0	39	42	40	44	47	45	37	35	24	4.6	14	35	29	27		
Potassium	3,700	4,200	4,200	3,800	2,800	3,200	540	350	2,800	3,400	3,500	3,000	3,600	3,700	3,200	2,900	1,900	260	880	2,700	2,100	2,000		
Selenium	1.3 J	1.4 J	1.0 J	1.1 J	0.94 J	1.1 J	0.31 U	0.34 U	0.85 J	1.1 J	0.91 J	1.1 J	1.2 J	0.83 U	0.72 J	0.49 U	0.78 J	0.3 J	0.43 J	1.0 J	0.55 J	0.82 J		
Sodium	260 U	320 U	320 U	300 U	210 U	190 U	100 U	120 U	200 U	230 U	240 U	110 U	110	140 U	110 U	83 U	160 U	97 U	120 U	170 U	160 U	190 U		
Thallium	0.61 J	0.98 J	0.73 J	0.62 J	0.6 J	0.68 J	0.11 J	0.11 U	0.54 J	0.61 J	0.56 J	0.72 J	0.72 J	0.64 J	0.53 J	0.48 J	0.36 J	0.094 U	0.19 J	0.5 J	0.42 J	0.36 J		
Vanadium	43	46	42	39	38	36	7.4	6.1	35	38	36	39	43	41	34	32	21	3.8	11	32	23	23		
Zinc	210	220	200	190	150	130	40	31	130	140	130	180	170	150	120	120	78	14	42	120	86	86		
Antimony	0.68 J	0.67	0.77	0.6	0.49	0.52	0.093 J	0.051 J	0.57	0.6	0.62	0.69 J	0.64	0.59 J	0.51 J	0.45 J	0.4 J	0.14 J	0.14 J	0.42 J	0.28 J	0.28 J		
Silver	0.61	0.58	0.66	0.46	0.21 J	0.24 J	0.039 J	0.026 J	0.21 J	0.23 J	0.23 J	0.23 J	0.23 J	0.21 J	0.19 J	0.19 J	0.13 J	0.022 J	0.14 J	0.16 J	0.13 J	0.13 J		
Mercury	0.33	0.37	0.32	0.3	0.12	0.11	0.016 J	0.0072 J	0.1	0.1	0.097	0.1	0.089	0.088 J	0.096	0.1	0.07	0.0051 J	0.036 J	0.091	0.1	0.089		

Note: Results are reported as dry weight. Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

J = Indicates parameter detected at a level below the reporting limit (RL) but greater than the established method detection limit (MDL). There is greater uncertainty associated with these results and data should be considered as estimated.

Table 13: Bulk polycyclic aromatic hydrocarbon (PAH) analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (RTI, 2011).

PAH Compound - µg/Kg (ppb)	Lake Erie Sites																																			
	Reference Area Sites (SL)								Lake Placement Area Sites (SD)				Nearshore Placement Area Sites (SN)				Sandusky Harbor Federal Navigation Channel Sites																				
	Dock Channel Sites						Bay Channel Sites (Including Turning Basin)										Straight Channel Sites				Moseley Channel Sites																
	SL-1		SL-2		SL-3		SL-4		SD-1		SD-2		SN-1		SN-2		SH-1		SH-2		SH-3		SH-4		SH-5		SH-6		SH-7		SH-8		SH-9		SH-10		SH-11		SH-12		SH-13		SH-14	
2-Methylnaphthalene	15	U	15	U	15	U	14	U	9.9	U	47	U	5.6	U	5.5	U	12	U	14	U	13	U	14	U	26	J	14	U	12	U	12	U	9.4	U	5.3	U	6.8	U	10	U	9.1	U	8.8	U
Acenaphthene	13	U	13	U	14	U	12	U	8.9	U	42	U	5.1	U	4.9	U	11	U	12	U	12	U	12	U	12	U	12	U	11	U	11	U	8.4	U	4.8	U	6.1	U	9.3	U	8.1	U	7.9	U
Acenaphthylene	28	J	11	U	11	U	9.9	U	7.1	U	34	U	4	U	3.9	U	8.7	U	9.8	U	9.4	U	9.8	U	9.6	U	9.8	U	8.7	U	8.4	U	6.7	U	3.8	U	4.9	U	7.4	U	6.5	U	6.3	U
Anthracene	30	J	16	U	17	U	15	U	11	U	52	U	6.3	U	6.1	U	13	U	15	U	15	U	15	U	15	U	15	U	13	U	13	U	10	U	5.9	U	7.5	U	12	U	17	J	9.8	U
Benzo(a)anthracene	100	J	77	J	43	J	79	J	45	J	52	U	11	J	10	J	62	J	85	Jm	72	Jm	41	J	62	J	52	J	26	J	32	J	22	J	5.9	U	21	J	63	Jm	120	J	36	J
Benzo(a)pyrene	98	J	74	J	34	J	73	J	42	J	53	U	6.4	U	6.2	U	59	J	82	J	71	J	37	J	15	U	48	J	14	U	28	J	11	U	6.1	U	16	J	63	J	91	J	28	J
Benzo(b)fluoranthene	120	Jm	110	Jm	47	mJ	92	Jm	69	Jm	61	U	7.3	U	7.1	U	93	Jm	120	Jm	93	Jm	59	Jm	96	Jm	87	Jm	28	Jm	42	Jm	22	mJ	6.9	U	22	J	95	Jm	150	Jm	37	Jm
Benzo(g,h,i)perylene	78	J	52	J	32	U	53	J	22	J	99	U	12	U	12	U	51	J	74	J	62	J	29	U	66	J	29	U	25	U	25	U	20	U	11	U	14	U	51	J	40	J	18	U
Benzo(k)fluoranthene	69	Jm	45	Jm	34	mU	35	Jm	36	Jm	110	U	13	U	12	U	38	Jm	48	Jm	36	Jm	31	mU	45	Jm	43	Jm	27	U	27	mU	21	U	12	U	16	Jm	37	Jm	64	Jm	25	Jm
Chrysene	100	J	84	J	37	J	85	J	51	J	55	U	6.5	U	12	Jm	60	J	91	J	74	J	45	J	75	J	61	J	14	U	31	J	11	U	6.2	U	18	J	74	J	130	J	35	J
Dibenzo(a,h)anthracene	83	U	83	U	85	U	77	U	55	U	260	U	32	U	31	U	68	U	77	U	73	U	76	U	75	U	76	U	68	U	66	U	53	U	30	U	38	U	58	U	51	U	49	U
Fluoranthene	150	J	140	J	59	J	130	J	90	J	51	U	15	J	22	J	130	J	150	J	140	J	70	J	140	J	110	J	37	J	57	J	27	J	5.8	U	29	J	130	J	190	J	61	J
Fluorene	26	J	15	U	15	U	14	U	9.9	U	47	U	5.7	U	5.5	U	12	U	14	U	13	U	14	U	13	U	14	U	12	U	12	U	9.4	U	5.4	U	6.8	U	10	U	9.1	U	8.8	U
Indeno(1,2,3-cd)pyrene	94	U	93	U	95	U	87	U	62	U	300	U	35	U	35	U	76	U	86	U	82	U	86	U	84	U	86	U	76	U	74	U	59	U	34	U	43	U	65	U	57	U	55	U
Naphthalene	29	U	29	U	30	U	27	U	19	U	92	U	11	U	11	U	24	U	27	U	26	U	27	U	26	U	27	U	24	U	23	U	18	U	10	U	13	U	20	U	18	U	17	U
Phenanthrene	56	J	37	J	12	U	39	J	33	J	37	U	4.5	U	4.3	U	33	J	49	J	43	J	27	J	57	J	36	J	9.6	U	19	J	7.4	U	4.2	U	11	J	40	J	57	J	20	J
Pyrene	130	J	110	J	62	J	110	J	83	J	94	U	13	J	18	J	95	J	130	J	100	J	63	J	91	J	98	J	36	J	51	J	25	J	11	U	29	J	100	J	180	J	56	J
Total PAHs*	1,204.0		989.0		627.0		937.9		643.9		1,439.0		187.8		201.0		833.7		1,069.8		921.4		641.8		881.6		803.8		429.3		519.4		330.9		163.0		295.3		834.7		1,188.7		469.8	

Note: Results are reported as dry weight. Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

J = Indicates parameter detected at a level below the reporting limit (RL) but greater than the established method detection limit (MDL). There is greater uncertainty associated with these results and data should be considered as estimated.

m = Manual integration used to determine area response.

*Includes sum of the 16 priority pollutant PAHs (excludes 2-methylnaphthalene). Full value of MDL used for non-detected parameters.

Table 14: Bulk polychlorinated biphenyl (PCB) analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (RTI, 2011).

PCB Aroclor - µg/Kg (ppb)	Lake Erie Sites										Sandusky Harbor Federal Navigation Channel Sites																	
	Reference Area Sites (SL)				Lake Placement Area Sites (SD)		Nearshore Placement Area Sites (SN)		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites									
	SL-1	SL-2	SL-3	SL-4	SD-1	SD-2	SN-1	SN-2	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
Aroclor-1016	10 U	10 U	10 U	9.5 U	6.8 U	6.5 U	3.9 U	3.8 U	8.4 U	9.4 U	9.1 U	9.4 U	9.2 U	9.4 U	8.4 U	8.1 U	6.5 U	3.7 U	4.7 U	7.1 U	6.2 U	6.1 U
Aroclor-1221	10 U	10 U	10 U	9.4 U	6.8 U	6.4 U	3.9 U	3.8 U	8.3 U	9.4 U	9 U	9.4 U	9.2 U	9.3 U	8.3 U	8.1 U	6.4 U	3.7 U	4.7 U	7.1 U	6.2 U	6.0 U
Aroclor-1232	15 U	15 U	16 U	14 U	10 U	9.6 U	5.8 U	5.7 U	12 U	14 U	14 U	14 U	14 U	14 U	12 U	12 U	9.6 U	5.5 U	7.0 U	11 U	9.3 U	9.0 U
Aroclor-1242	13 U	13 U	13 U	12 U	8.5 U	8.0 U	4.8 U	4.7 U	10 U	12 U	11 U	12 U	11 U	12 U	10 U	10 U	8.0 U	4.6 U	5.8 U	8.8 U	7.7 U	7.5 U
Aroclor-1248	12 U	12 U	12 U	11 U	8.0 U	7.5 U	4.5 U	4.4 U	9.8 U	11 U	11 U	11 U	11 U	11 U	9.8 U	9.5 U	7.5 U	4.3 U	5.5 U	8.3 U	7.3 U	7.1 U
Aroclor-1254	14 U	14 U	15 U	13 U	9.6 U	9.1 U	5.5 U	5.3 U	12 U	13 U	13 U	13 U	13 U	13 U	12 U	11 U	9.1 U	5.2 U	6.6 U	10 U	8.8 U	8.5 U
Aroclor-1260	10 U	10 U	10 U	9.2 U	6.6 U	6.3 U	3.8 U	3.7 U	8.1 U	9.2 U	8.8 U	9.1 U	9.0 U	9.1 U	8.1 U	7.9 U	6.3 U	3.6 U	4.5 U	6.9 U	6.1 U	5.9 U
Aroclor-1262	14 U	13 U	14 U	13 U	9.0 U	8.5 U	5.1 U	5.0 U	11 U	12 U	12 U	12 U	12 U	12 U	11 U	11 U	8.5 U	4.9 U	6.2 U	9.4 U	8.2 U	8.0 U

Note: Results are reported as dry weight. Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

Table 15: Bulk pesticide analyses on Sandusky Harbor Federal navigation channel and Lake Erie vicinity sediments (RTI, 2011).

Pesticide - µg/Kg (ppb)	Lake Erie Sites										Sandusky Harbor Federal Navigation Channel Sites																			
	Reference Area Sites (SL)				Lake Placement Area Sites (SD)		Nearshore Placement Area Sites (SN)		Dock Channel Sites			Bay Channel Sites (including Turning Basin)								Straight Channel Sites		Moseley Channel Sites							
	SL-1	SL-2	SL-3	SL-4	SD-1	SD-2	SN-1	SN-2	SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14								
4,4-DDD	1.8 U	1.8 U	1.9 U	1.7 U	1.2 U	1.2 U	0.7 U	0.68 U	1.5 U	1.7 U	1.6 U	1.7 U	1.7 U	1.7 U	1.5 U	1.5 U	1.2 U	0.67 U	0.84 U	1.3 U	1.1 U	1.1 U								
4,4-DDE	1.1 U	1.1 U	1.1 U	1.0 U	0.72 U	0.68 U	0.41 U	0.4 U	0.88 U	0.99 U	0.95 U	0.99 U	0.97 U	0.99 U	0.88 U	0.85 U	0.68 U	0.39 U	0.49 U	0.75 U	0.66 U	0.63 U								
4,4-DDT	1.2 U	1.2 U	1.2 U	1.1 U	0.8 U	0.75 U	0.45 U	0.44 U	0.98 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.98 U	0.95 U	0.75 U	0.43 U	0.55 U	0.83 U	0.73 U	0.71 U								
Aldrin	1.1 U	1.1 U	1.2 U	1.1 U	0.77 U	0.72 U	0.44 U	0.43 U	0.94 U	1.1 U	1.0 U	1.1 U	1.0 U	1.1 U	0.94 U	0.91 U	0.72 U	0.41 U	0.52 U	0.8 U	0.7 U	0.68 U								
alpha-BHC	1.0 U	1.0 U	1.0 U	0.92 U	0.67 U	0.63 U	0.38 U	0.37 U	0.81 U	0.92 U	0.88 U	0.92 U	0.9 U	0.91 U	0.81 U	0.79 U	0.63 U	0.36 U	0.46 U	0.69 U	0.61 U	0.59 U								
alpha-Chlordane	1.3 U	1.3 U	1.3 U	1.2 U	0.85 U	0.8 U	0.48 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.0 U	1.0 U	0.8 U	0.46 U	0.58 U	0.88 U	0.78 U	0.75 U								
beta-BHC	1.2 U	1.2 U	1.2 U	1.1 U	0.81 U	0.77 U	0.46 U	0.45 U	1.0 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	0.99 U	0.96 U	0.77 U	0.44 U	0.56 U	0.85 U	0.74 U	0.72 U								
Chlordane (Technical)	12 U	12 U	12 U	11 U	7.9 U	7.5 U	4.5 U	4.4 U	9.7 U	11 U	10 U	11 U	11 U	11 U	9.7 U	9.4 U	7.5 U	4.3 U	5.4 U	8.2 U	7.2 U	7.0 U								
delta-BHC	1.0 U	1.0 U	1.0 U	0.92 U	0.67 U	0.63 U	0.38 U	0.37 U	0.81 U	0.92 U	0.88 U	0.92 U	1.9 J	0.91 U	0.81 U	0.79 U	0.63 U	0.36 U	0.46 U	0.69 U	0.61 U	0.59 U								
Dieldrin	1.2 U	1.2 U	1.3 U	1.1 U	0.82 U	0.77 U	0.47 U	0.45 U	1.0 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.0 U	0.97 U	0.77 U	0.44 U	0.56 U	0.85 U	0.75 U	0.72 U								
Endosulfan I	1.3 U	1.3 U	1.3 U	1.2 U	0.85 U	0.81 U	0.49 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.0 U	1.0 U	0.81 U	0.46 U	0.58 U	0.89 U	0.78 U	0.75 U								
Endosulfan II	1.3 U	1.3 U	1.3 U	1.2 U	0.85 U	0.8 U	0.48 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.0 U	1.0 U	0.8 U	0.46 U	0.58 U	0.88 U	0.77 U	0.75 U								
Endosulfan sulfate	1.3 U	1.3 U	1.3 U	1.2 U	0.85 U	0.81 U	0.49 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U	1.0 U	1.0 U	0.81 U	0.46 U	0.58 U	0.89 U	0.78 U	0.75 U								
Endrin	1.3 U	1.3 U	1.3 U	1.2 U	0.87 U	0.82 U	0.5 U	0.48 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.0 U	0.82 U	0.47 U	0.6 U	0.91 U	0.8 U	0.77 U								
Endrin aldehyde	1.3 U	1.3 U	1.4 U	1.2 U	0.89 U	0.84 U	0.51 U	0.49 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.1 U	0.84 U	0.48 U	0.61 U	0.93 U	0.81 U	0.79 U								
Endrin ketone	1.2 U	1.2 U	1.3 U	1.2 U	0.83 U	0.78 U	0.47 U	0.46 U	1.0 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.0 U	0.98 U	0.78 U	0.45 U	0.57 U	0.87 U	0.76 U	0.73 U								
gamma-BHC (Lindane)	1.0 U	1.0 U	1.1 U	0.96 U	0.69 U	0.65 U	0.39 U	0.38 U	0.85 U	0.96 U	0.92 U	0.95 U	0.94 U	0.95 U	0.85 U	0.82 U	0.65 U	0.37 U	0.47 U	0.72 U	0.63 U	0.61 U								
gamma-Chlordane	1.3 U	1.3 U	1.3 U	1.2 U	0.85 U	0.8 U	0.48 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.0 U	1.0 U	0.8 U	0.46 U	0.58 U	0.89 U	0.78 U	0.75 U								
Heptachlor	1.2 U	1.2 U	1.3 U	1.2 U	0.83 U	0.79 U	0.47 U	0.46 U	1.0 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.0 U	0.99 U	0.79 U	0.45 U	0.57 U	0.87 U	0.76 U	0.74 U								
Heptachlor epoxide	1.3 U	1.3 U	1.3 U	1.2 U	0.84 U	0.79 U	0.48 U	0.47 U	1.0 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.0 U	1.0 U	0.79 U	0.45 U	0.58 U	0.88 U	0.77 U	0.74 U								
Methoxychlor	1.3 U	1.3 U	1.3 U	1.2 U	0.87 U	0.82 U	0.5 U	0.48 U	1.1 U	1.2 U	1.2 U	1.2 U	8.5	1.2 U	1.1 U	1.0 U	0.82 U	0.47 U	0.6 U	0.91 U	0.79 U	0.77 U								
Toxaphene	17 U	17 U	17 U	16 U	11 U	11 U	6.5 U	6.3 U	14 U	16 U	15 U	16 U	15 U	16 U	14 U	14 U	11 U	6.1 U	7.8 U	12 U	10 U	10 U								

Note: Results are reported as dry weight. Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

J = Indicates parameter detected at a level below the reporting limit (RL) but greater than the established method detection limit (MDL). There is greater uncertainty associated with these results and data should be considered as estimated.

Table 16: Elutriate inorganics analyses on Sandusky Harbor Federal Navigation channel sediments and Lake Erie site water (RTI, 2011).

Inorganic Parameter - mg/L (ppm)	Lake Site Water	Sandusky Harbor Federal Navigation Channel Sites													
		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites			
		SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
Oil and Grease	**0.93 J**	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	**1.0 J**	0.64 U	**0.9 J**	0.64 U	0.64 U	0.64 U	0.64 U	**0.71 J**
Nitrogen, Total Kjeldahl	**0.71**	**1.5**	**1.4**	**1.2**	**2.6**	**2.1**	**1.1**	**1.0**	**1.5**	**1.3**	**0.93**	**1.6**	**3.1**	**1.7**	**1.4**
Nitrogen, Ammonia	**0.18**	**1.1**	**1.4**	**0.87**	**2.4**	**2**	**1.1**	**0.77**	**1.2**	**0.93**	**0.16**	**1.0**	**3.1**	**1.8**	**1.3**
Phosphorus, Total as P	**0.16**	**0.046**	**0.047**	**0.037**	**0.028**	**0.039**	**0.039**	**0.043**	**0.03**	**0.053**	**0.024**	**0.033**	**0.021**	**0.031**	**0.023**
Cyanide, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U

Note: Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

J = Indicates parameter detected at a level below the reporting limit (RL) but greater than the established method detection limit (MDL). There is greater uncertainty associated with these results and data should be considered as estimated.

Table 17: Elutriate metals analyses on Sandusky Harbor Federal Navigation channel sediments and Lake Erie site water (RTI, 2011).

Metal - mg/L (ppm)	Lake Site Water	Sandusky Harbor Federal Navigation Channel Sites													
		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites			
		SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
Aluminum	0.23	0.22	0.028	0.038	0.028	0.04	0.072	0.051	0.035	0.25	0.046	0.055	0.076	0.037	0.055
Arsenic	0.0018	0.0039	0.0025	0.002	0.0018	0.0024	0.0022	0.002	0.0015	0.0022	0.001	0.0025	0.0018	0.0021	0.0011
Barium	0.025	0.19	0.18	0.19	0.14	0.16	0.15	0.16	0.14	0.15	0.19	0.17	0.17	0.16	0.17
Beryllium	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Cadmium	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U	0.00011 U
Calcium	35	39	39	41	39	44	38	41	40	39	39	37	39	39	38
Chromium	0.00086 J	0.00059 J	0.00047 J	0.0004 J	0.0005 J	0.00046 J	0.00042 J	0.00048 J	0.0004 J	0.00062 J	0.00042 J	0.00048 J	0.0005 J	0.00044 J	0.00041 J
Cobalt	0.0002 J	0.00022 J	0.00029 J	0.00012 J	0.0001 J	0.00011 J	0.000086 J	0.000096 J	0.000082 J	0.0002 J	0.00008 J	0.000084 J	0.00014 J	0.00008 J	0.000084 J
Copper	0.0017 J	0.0016 J	0.0012 J	0.0013 J	0.001 J	0.0011 J	0.001 J	0.0011 J	0.0012 J	0.0015 J	0.0017 J	0.0014 J	0.0013 J	0.0012 J	0.0012 J
Iron	0.35	0.31	0.055	0.061	0.087	0.079	0.085	0.074	0.058	0.37	0.065	0.081	0.15	0.056	0.082
Lead	0.00049	0.0003 J	0.00011 J	0.00011 J	0.0001 J	0.0001 J	0.00011 J	0.00012 J	0.000096 U	0.00031 J	0.00012 J	0.0003 J	0.00013 J	0.00011 J	0.00012 J
Magnesium	10	9.3	9.6	9.5	10	10	9.6	9.8	9.9	9.5	10	10	10	10	9.3
Manganese	0.018	0.14	0.071	0.043	0.074	0.13	0.057	0.028	0.017	0.091	0.0035	0.072	0.18	0.089	0.041
Nickel	0.0021 J	0.0021 J	0.0018 J	0.0017 J	0.0018 J	0.0016 J	0.0015 J	0.0016 J	0.0016 J	0.002 J	0.0015 J	0.0016 J	0.0016 J	0.0015 J	0.0015 J
Potassium	2.3	2.3	2.3	2.2	2.5	2.7	2.6	2.5	2.5	2.3	2.0 J	2.2	2.7	2.4	2.3
Selenium	0.001 J	0.00077 J	0.00095 J	0.00058 U	0.00087 J	0.00058 U	0.00064 J	0.001 J	0.00076 J	0.00058 U	0.00068 J	0.00086 J	0.00058 U	0.001 J	0.00098 J
Sodium	12	14	13	14	13	14	14	14	13	13	15	14	14	14	14
Thallium	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.000066 U	0.00035 J
Vanadium	0.0012	0.00061 J	0.00032 J	0.00047 J	0.00031 J	0.00041 J	0.00061 J	0.00075 J	0.00052 J	0.00072 J	0.00066 J	0.0005 J	0.00044 J	0.00039 J	0.00037 J
Zinc	0.016 J	0.065	0.033	0.036	0.03	0.032	0.03	0.028	0.027	0.031	0.041	0.032	0.038	0.033	0.11
Antimony	0.00052 U	0.00094 J	0.00066 J	0.00059 J	0.00052 U	0.00052 U	0.00058 J	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.00052 U	0.001 J	0.00052 U	0.00052 U
Silver	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00018 U
Mercury	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U	0.000027 U

Note: Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

J = Indicates parameter detected at a level below the reporting limit (RL) but greater than the established method detection limit (MDL). There is greater uncertainty associated with these results and data should be considered as estimated.

Table 18: Elutriate polycyclic aromatic hydrocarbon (PAH) analyses on Sandusky Harbor Federal Navigation channel sediments and Lake Erie site water (RTI, 2011).

PAH Compound - µg/L (ppb)	Lake Site Water	Sandusky Harbor Federal Navigation Channel Sites															
		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites					
		SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
2-Methylnaphthalene	0.25 U	0.28 U	0.26 U	0.29 U	0.28 U	0.27 U	0.28 U	0.26 U	0.26 U	0.27 U	0.26 U	0.3 U	0.28 U	0.3 U	0.31 U
Acenaphthene	0.19 U	0.21 U	0.2 U	0.22 U	0.21 U	0.21 U	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.23 U	0.21 U	0.23 U	0.24 U
Acenaphthylene	0.18 U	0.2 U	0.19 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.22 U	0.2 U	0.21 U	0.22 U
Anthracene	0.18 U	0.2 U	0.19 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.22 U	0.2 U	0.22 U	0.22 U
Benzo(a)anthracene	0.18 U	0.21 U	0.19 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.22 U	0.2 U	0.22 U	0.23 U
Benzo(a) pyrene	0.16 U	0.19 U	0.17 U	0.19 U	0.18 U	0.18 U	0.18 U	0.17 U	0.17 U	0.18 U	0.17 U	0.2 U	0.18 U	0.2 U	0.2 U
Benzo(b) fluoranthene	0.22 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U	0.25 U	0.23 U	0.27 U	0.25 U	0.27 U	0.28 U
Benzo(g,h,i) perylene	0.24 U	0.28 U	0.26 U	0.29 U	0.27 U	0.27 U	0.27 U	0.26 U	0.26 U	0.27 U	0.25 U	0.3 U	0.27 U	0.29 U	0.3 U
Benzo(k) fluoranthene	0.19 U	0.22 U	0.21 U	0.23 U	0.22 U	0.22 U	0.22 U	0.21 U	0.21 U	0.22 U	0.2 U	0.24 U	0.22 U	0.24 U	0.25 U
Chrysene	0.19 U	0.22 U	0.2 U	0.22 U	0.21 U	0.21 U	0.21 U	0.2 U	0.2 U	0.21 U	0.2 U	0.23 U	0.21 U	0.23 U	0.24 U
Dibenzo(a,h) anthracene	0.26 U	0.3 U	0.28 U	0.31 U	0.29 U	0.29 U	0.29 U	0.27 U	0.27 U	0.29 U	0.27 U	0.32 U	0.29 U	0.31 U	0.33 U
Fluoranthene	0.18 U	0.21 U	0.19 U	0.21 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.2 U	0.19 U	0.22 U	0.2 U	0.22 U	0.23 U
Fluorene	0.16 U	0.19 U	0.18 U	0.2 U	0.19 U	0.18 U	0.19 U	0.18 U	0.18 U	0.18 U	0.17 U	0.2 U	0.19 U	0.2 U	0.21 U
Indeno(1,2,3-cd) pyrene	0.25 U	0.29 U	0.27 U	0.3 U	0.29 U	0.28 U	0.28 U	0.27 U	0.27 U	0.28 U	0.27 U	0.31 U	0.28 U	0.31 U	0.32 U
Naphthalene	0.22 U	0.25 U	0.24 U	0.26 U	0.25 U	0.25 U	0.25 U	0.24 U	0.24 U	0.25 U	0.23 U	0.27 U	0.25 U	0.27 U	0.28 U
Phenanthrene	0.14 U	0.16 U	0.15 U	0.16 U	0.15 U	0.15 U	0.15 U	0.14 U	0.14 U	0.15 U	0.14 U	0.17 U	0.15 U	0.16 U	0.17 U
Pyrene	0.21 U	0.24 U	0.22 U	0.25 U	0.24 U	0.23 U	0.23 U	0.22 U	0.22 U	0.23 U	0.22 U	0.26 U	0.23 U	0.25 U	0.26 U

Note: Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

Table 19: Elutriate polchlorinated bipheynl (PCB) analyses on Sandusky Harbor Federal Navigation channel sediments and Lake Erie site water (RTI, 2011).

PCB Aroclor - µg/L (ppb)	Lake Site Water	Sandusky Harbor Federal Navigation Channel Sites															
		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites					
		SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
Aroclor-1016	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.03 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Aroclor-1221	0.03 U	0.04 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.04 U	0.03 U	0.04 U	0.04 U	0.03 U	0.03 U	0.03 U	0.03 U
Aroclor-1232	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.04 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor-1242	0.04 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.05 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U
Aroclor-1248	0.03 U	0.04 U	0.04 U	0.03 U	0.04 U	0.03 U	0.03 U	0.04 U	0.03 U	0.04 U	0.04 U	0.04 U	0.04 U	0.03 U	0.03 U	0.03 U	0.03 U
Aroclor-1254	0.04 U	0.05 U	0.05 U	0.04 U	0.05 U	0.04 U	0.04 U	0.05 U	0.04 U	0.05 U	0.05 U	0.05 U	0.05 U	0.04 U	0.04 U	0.04 U	0.04 U
Aroclor-1260	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Aroclor-1262	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor-1268	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Note: Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).

Table 20: Elutriate pesticides analyses on Sandusky Harbor Federal Navigation channel sediments and Lake Erie site water (RTI, 2011).

Pesticide - µg/L (ppb)	Lake Site Water	Sandusky Harbor Federal Navigation Channel Sites													
		Dock Channel Sites			Bay Channel Sites (including Turning Basin)					Straight Channel Sites		Moseley Channel Sites			
		SH-1	SH-2	SH-3	SH-4	SH-5	SH-6	SH-7	SH-8	SH-9	SH-10	SH-11	SH-12	SH-13	SH-14
4,4-DDD	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
4,4-DDE	0.0029 U	0.0033 U	0.003 U	0.0029 U	0.003 U	0.0028 U	0.0029 U	0.003 U	0.0026 U	0.0031 U	0.003 U	0.0032 U	0.0032 U	0.0029 U	0.0029 U
4,4-DDT	0.0034 U	0.004 U	0.0036 U	0.0034 U	0.0036 U	0.0034 U	0.0035 U	0.0035 U	0.0031 U	0.0037 U	0.0036 U	0.0039 U	0.0039 U	0.0034 U	0.0034 U
Aldrin	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
alpha-BHC	0.0022 U	0.0026 U	0.0023 U	0.0022 U	0.0023 U	0.0022 U	0.0022 U	0.0023 U	0.002 U	0.0024 U	0.0023 U	0.0025 U	0.0025 U	0.0022 U	0.0022 U
alpha-Chlordane	0.0034 U	0.004 U	0.0036 U	0.0034 U	0.0036 U	0.0034 U	0.0035 U	0.0035 U	0.0031 U	0.0037 U	0.0036 U	0.0039 U	0.0039 U	0.0034 U	0.0034 U
Beta-BHC	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
Chlordane (Technical)	0.037 U	0.042 U	0.038 U	0.036 U	0.038 U	0.036 U	0.037 U	0.038 U	0.033 U	0.04 U	0.038 U	0.041 U	0.041 U	0.036 U	0.036 U
delta-BHC	0.0022 U	0.0026 U	0.0023 U	0.0022 U	0.0023 U	0.0022 U	0.0022 U	0.0023 U	0.002 U	0.0024 U	0.0023 U	0.0025 U	0.0025 U	0.0022 U	0.0022 U
Dieldrin	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
Endosulfan I	0.0034 U	0.004 U	0.0036 U	0.0034 U	0.0036 U	0.0034 U	0.0035 U	0.0035 U	0.0031 U	0.0037 U	0.0036 U	0.0039 U	0.0039 U	0.0034 U	0.0034 U
Endosulfan II	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
Endosulfan sulfate	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
Endrin	0.003 U	0.0035 U	0.0031 U	0.003 U	0.0031 U	0.0029 U	0.003 U	0.0031 U	0.0027 U	0.0033 U	0.0031 U	0.0034 U	0.0034 U	0.003 U	0.003 U
Endrin aldehyde	0.0039 U	0.0045 U	0.0041 U	0.0038 U	0.0041 U	0.0038 U	0.0039 U	0.004 U	0.0035 U	0.0042 U	0.0041 U	0.0044 U	0.0044 U	0.0038 U	0.0038 U
Endrin ketone	0.0034 U	0.004 U	0.0036 U	0.0034 U	0.0036 U	0.0034 U	0.0035 U	0.0035 U	0.0031 U	0.0037 U	0.0036 U	0.0039 U	0.0039 U	0.0034 U	0.0034 U
gamma-BHC (Lindane)	0.0022 U	0.0026 U	0.0023 U	0.0022 U	0.0023 U	0.0022 U	0.0022 U	0.0023 U	0.002 U	0.0024 U	0.0023 U	0.0025 U	0.0025 U	0.0022 U	0.0022 U
gamma-Chlordane	0.0034 U	0.004 U	0.0036 U	0.0034 U	0.0036 U	0.0034 U	0.0035 U	0.0035 U	0.0031 U	0.0037 U	0.0036 U	0.0039 U	0.0039 U	0.0034 U	0.0034 U
Heptachlor	0.0031 U	0.0036 U	0.0033 U	0.0031 U	0.0033 U	0.003 U	0.0031 U	0.0032 U	0.0028 U	0.0034 U	0.0033 U	0.0035 U	0.0035 U	0.0031 U	0.0031 U
Heptachlor epoxide	0.0036 U	0.0041 U	0.0037 U	0.0035 U	0.0037 U	0.0035 U	0.0036 U	0.0036 U	0.0032 U	0.0039 U	0.0037 U	0.004 U	0.004 U	0.0035 U	0.0035 U
Methoxychlor	0.0033 U	0.0038 U	0.0035 U	0.0033 U	0.0035 U	0.0033 U	0.0034 U	0.0034 U	0.003 U	0.0036 U	0.0035 U	0.0038 U	0.0038 U	0.0033 U	0.0033 U
Toxaphene	0.044 U	0.051 U	0.047 U	0.044 U	0.047 U	0.043 U	0.045 U	0.045 U	0.04 U	0.048 U	0.047 U	0.05 U	0.05 U	0.044 U	0.044 U

Note: Positive detections are presented in bold.

U = Indicates the parameter was analyzed for but not detected at or above the method detection limit (MDL).