CONTINUATION SHEET

Application for OEPA Section 401 State Water Quality Certification

TOLEDO HARBOR (LAKE APPROACH CHANNEL AND LOWER RIVER CHANNEL)
MAINTENANCE DREDGING PROJECT

5. The project is located at Toledo Harbor, Lucas County, Ohio. The latitude/longitude of the dredging activity is 41°41'49"N/83°27'49"W. The latitude/longitude of the open-lake placement area is 41°46'10"N/83°15'39"W.

7. Environmental Impact Statement (EIS), Operation and Maintenance, Toledo Harbor, Ohio

< Issuing Agency – U.S. Army Corps of Engineers
< Type of Approval – Statement of Findings (SOF)
< Date of Application – February 1976
< Date of Approval – May 1976

Environmental Assessment (EA) and Section 404(b)(1) Evaluation, Operation and Maintenance, Toledo Harbor, Ohio

< Issuing Agency - U.S. Army Corps of Engineers
< Type of Approval - Finding of No Significant Impact (FONSI) and Section 404(b)(1) Evaluation
< Date of Application - 29 December 1988
< Date of Approval - 18 August 1989

EA and Section 404(b)(1) Evaluation, Operation and Maintenance, Toledo Harbor, Ohio

< Issuing Agency - U.S. Army Corps of Engineers
< Type of Approval – FONSI and Section 404(b)(1) Evaluation
< Date of Application – 8 August 2007
< Date of Approval – 24 July 2009

8a. The project entails the maintenance dredging of sediments from the authorized Lake Approach Channel and lower River Channels of Toledo Harbor, Lucas County, Ohio. In 2012, an estimated total of 1,100,000 cubic yards of material will be dredged from the Federal navigation project. The channels would be dredged to authorized limits and depths, and up to one additional foot of material may be removed to account for dredging tolerance. The quality of the material has been evaluated using 2004, 2006 and 2010 sediment data in accordance with the protocols and guidelines contained in the U.S. Environmental Protection Agency (USEPA)/USACE 1998 Great Lakes Dredged Material Testing and Evaluation Manual. This evaluation concluded that material in the Lake Approach Channel and lower River Channel downstream of River Mile 0.75 (Figure 1) was toxicologically comparable to sediments at open-lake areas in the Western Basin of

Lake Erie. Consequently, material dredged from this area was determined to meet Federal guidelines for open-lake placement. An estimated 1,100,000 cubic yards of this dredged material will be placed at the existing two-square mile open-lake placement area in the Western Basin of Lake Erie, located three and one-half miles from the Toledo Harbor light at an azimuth of 033°00' (Figure 2). This site has been previously used by the USACE for the placement of Toledo Harbor dredged material. In response to local concerns, dredged material placement will be restricted to the northeast half of this area. Most of the dredged material being placed in the open-lake area is from the Lake Approach Channel in the Western Basin of Lake Erie, and all is from the same lacustrine system. The 2012 dredging operation at Toledo Harbor is tentatively scheduled to be performed during the period between 1 July and 30 November. A contractor of the Federal government will accomplish the project, and the type of equipment used to perform the maintenance dredging will depend on the contractor performing the work. 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 deep-draft commercial navigation. This project was congressionally authorized by the 1899, 1910, 1935, 1950, 1954, 1958 and 1960 River and Harbor Acts. If the harbor's Lake Approach Channel is not dredged to authorized depth, commercial navigation will eventually be adversely affected.

8c. Based on past testing programs, the material to be dredged consists mainly of silts and clays. Approximately 1,100,000 cubic yards of sediments will be dredged from the harbor in 2012. All of this dredged material will be subsequently discharged as described in Item 8a of this application. Additional information on the dredged material can be found in the 2009 EA and Section 404(b)(1) Evaluation.

9. The 2012 Toledo Harbor dredging project involves maintenance dredging of the Lake Approach Channel in Lake Erie and lower River Channel in Maumee River. The open-lake placement area is located in Lake Erie.

10. Some relevant information required under this item is included in the EIS, EAs and Section 404(b)(1) Evaluations specified above and previously furnished to OEPA. The following is a summary of the information contained in these documents that apply to this item of the application:

a. Descriptions.

(1) *Preferred Design Alternative*: This alternative would entail the dredging of an estimated 1,500,000 cubic yards of dredged material from the Lake Approach Channel through Lake Mile 9 and lower River Channel downstream of River Mile 0.75 in 2012. This dredged material will be placed at the existing two-square mile open-lake placement area. A Contractor of the Federal government will accomplish the project, and the type of equipment used to perform the maintenance dredging will depend on the Contractor. Dredging will not be performed during Lake Erie storm events. The project will take about 180 to 220 days to complete.

(2) *Non-Degradation Alternative*: This is the "No Action" alternative. Toledo Harbor would not be dredged. 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 1,100,000 cubic yards of material from the Lake Approach Channel through Lake Mile 5 and River Channel downstream of River Mile 0.75 in 2012. This dredged material will be placed at the existing two-square mile open-lake placement area. In response to local concerns, dredged material placement will be restricted to the northeast half of this area. The dredging operations will be tentatively scheduled to be performed during the period between 1 July and 30 November in order to minimize impacts to local environmental resources, primarily fisheries. A Contractor of the Federal government will accomplish the project, and the type of equipment used to perform the maintenance dredging will depend on the Contractor. Dredging will not be performed during Lake Erie storm events. The project will take about 130 to 170 days to complete.

Note that the Minimum Degradation Alternative estimates dredging 400,000 cubic yards less than the Preferred Design Alternative. It is estimated that dredging activities specified in the Minimum Degradation Alternative will impact an estimated 428 acres (Attachment 1), which is 222 acres less of channel bottom/habitat than the 650 acres that would be impacted under the Preferred Design Alternative (Attachment 2) with an assumed shoal depth of three feet. The estimated "length" of Federal navigation channel (i.e., not actually stream) to be dredged under the Preferred Design and Minimum Degradation Alternatives are 52,340 and 34,000 linear feet, respectively. 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 channels to be dredged under either alternative.

b. Water Quality Impacts.

(1) *Preferred Design Alternative*: This alternative would result in a short-term, negligible lowering of ambient water quality, less than that which occurs during Lake Erie storm events. The main water quality impacts would be the generation of turbidity and variation of dissolved oxygen levels in the water column.

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. These types of sediments are homogenous and residually contaminated with pollutants that are ubiquitous throughout the Great Lakes. Sediments in the Lake Approach Channel are similar in chemistry, and toxicologically comparable, to bottom sediments in the Lake Erie Western Basin environs. A characterization of the Toledo Harbor Lake Approach Channel material is documented in the *Evaluation of Toledo Harbor Federal Navigation Channel Sediments With Respect to their Suitability for Open-lake Placement* provided to OEPA in 2010 and 2011. This

evaluation concludes that material dredged from the Toledo Harbor Lake Approach Channel, and River Channel downstream of River Mile 0.75, meets USEPA/USACE guidelines for open-lake placement, pursuant to Section 404 of the Clean Water Act. This evaluation also contains 2010 data on the ambient concentrations of contaminants, such as metals, nutrients, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and pesticides in Basin water. Standard elutriate test (SET) data on the dredged material indicate that discharge of this dredged material at the existing open-lake placement area in the Western Basin of Lake Erie complies with promulgated Ohio State Water Quality Standards for the Protection of Aquatic Life. For the general effects of this alternative's lowering of water quality on aquatic life, refer to the 2009 EA/FONSI and Section 404(b)(1) Evaluation. This EA/FONSI documents that the placement of the dredged material at the authorized area in the Western Basin of Lake Erie would not culminate in significant, adverse environmental impacts.

Open-lake placement of Toledo Harbor dredged material constitutes internal loading and does not result in a net increase of sediments into the Basin. In 2012, most material dredged from the Lake Approach Channel is within the natural limits of the Basin and all material dredged from the Lake Approach Channel and lower River Channel is from the lacustrine system. Therefore, the dredged sediments being relocated are not new inputs to the system. With respect to turbidity, the Basin is a naturally shallow and turbid aquatic ecosystem impacted by urbanization, point and non-point source pollution. Cultural eutrophication has been a chronic problem in the Basin due to nutrient loads that derive primarily from agricultural land use. These anthropogenic activities ultimately increase sediment load and turbidity in the Basin. Turbidity created by the mix of natural and anthropogenic activities within the Basin is enormous compared to that associated with the placement of Toledo Harbor dredged material. The amount of dredged material annually relocated in the Basin (for this exercise, the amount used is 1,250,000 cubic yards [estimated 1,450,000 metric tons {MT}]) should be viewed within the framework of the amount of sediments within the system and entering the Basin from other sources. For example, the Maumee River at Waterville annually contributes an estimated 1,500,000 cubic yards of sediments to the lower river and Basin. When compared to a very conservative estimate of 150,000,000 MT per year (the upper estimate is 300,000,000 MT) that are normally resuspended, the placement of Lake Approach Channel dredged material in the Basin is an extremely small fraction (i.e., less than 0.96 percent of the resuspended sediment load). Therefore, the open-lake placement of Toledo Harbor dredged material results in short-term turbidity, and does not induce widespread and or substantially increased background turbidity in the Basin. With respect to long-term movement of open-lake placement area sediments, 2010 studies and modeling show that bottom sediments in the area migrate in a net northeasterly to southeasterly direction, and do not reach City of Toledo and City of Oregon potable water intakes (PWIs) situated along the south shore of Maumee Bay east of the river mouth.

Concerning short-term turbidity-related impacts, the results of a preliminary field investigation in August 2005 on turbidity plumes relating to the placement of Toledo Harbor dredged material at the existing open-lake area indicated that plume migration was in a net northeasterly direction and decayed to near background (30 mg/L total suspended solids [TSS]) at 870 feet (0.17 miles) such that the maximum plume length observed was 1,115 feet (0.21 miles). The entire footprint

of the plume remained within the boundaries of the existing open-lake placement area. A subsequent modeling effort predominantly showed that only 1.5% of the sediment that is open-lake placed would remain in suspension after four hours, and less than 1% would be expected to remain in suspension after 24 hours. The TSS concentration associated with open-lake placement would be less than 12 mg/L and 1 mg/L above background after four and 24 hours, respectively. Therefore, turbidity plumes associated with the placement of dredged material at the open-lake area are small in spatial extent and magnitude. Toledo Harbor dredged material is typically released from a barge into the water column, and it therefore settles very rapidly as a mass that is similar to flocculent settling. Because it settles as a mass, very little turbidity is generated via a plume before the material reaches the lake bottom.

Based on this and other relevant scientific information, turbidity resulting from the placement of Toledo Harbor dredged material in the Basin is short-term and spatially limited.

Toledo Harbor sediment data from 2004 and 2006 show that the total phosphorus concentrations in the sediments proposed for open-lake placement range from 328 to 1,010 mg/kg, and average 630 mg/kg. These concentrations are comparable to those at the open-lake reference area (range = 457 to 585 mg/kg; average = 554 mg/kg). Sediment phosphorus is subject to resuspension in the Basin, whether it is in-place within the Lake Approach Channel or discharged at the open-lake placement area. Without considering availability or sedimentation, total phosphorus added to the Basin water column by open-lake placement (630 mg/kg suspended solids x 1.45 million MT suspended solids/year = 913 MT/year) is less than 10% of the total added annually by external loads (about 7,000 MT/year) or introduced into the water column by wind-driven resuspension (about 6,100 MT/year). This load, however, is truly a redistribution of total phosphorus and already counted as part of the external load.

A very small fraction of total phosphorus is released via open-lake placement of Toledo Harbor dredged material; the dredged material which then settles on the bottom behaves much like the surrounding lake bottom sediments. SET data on the dredged material are consistent with low phosphorus availability during placement, and resuspended bottom sediments from the Basin have higher bioavailable phosphorus when compared to Lake Erie tributary suspended solids or the dredged material itself. External tributary and point source loads and wind-induced resuspension of bottom sediments release far greater amounts of phosphorus into the water column than open-lake placed dredged material and have a much greater potential than dredged material to contribute to excessive growth of algae, including harmful algal blooms (HABs), in the Basin.

Microcystis or *Lyngbya* are the two key species of alga involved with HABs in the Basin. It has been perceived that the open-lake placement of Toledo Harbor dredged material has the potential to exacerbate the formation of HABs in the Basin, which typically occur in late summer. However, current research indicate that *Microcystis* blooms originate in the Maumee River and extend in a plume from the river mouth out into the bay and there is no spatial relationship with placement of the dredged material, while *Lyngbya* growth typically occurs along the western shoreline of the Basin. It is unlikely that these species' are obtaining their nutrients from Toledo

Harbor dredged material placement operations. Considerable evidence already exists regarding the release of phosphorus from Toledo Harbor dredged material. This evidence indicates no cause-and-effect relationship between the open-lake placement of Toledo Harbor dredge material and HABs. Further, the contribution from the open-lake placement of dredged material is a very minor facet of the overall Basin phosphorus budget, suggesting a low potential to affect HABs. The Ohio Lake Erie Phosphorus Task Force has reported that the most significant phosphorus loading to the Basin was dissolved reactive phosphorus (DRP) in runoff from agricultural land use. This form of phosphorus is the most available to algae and is not attached to sediment (including dredged material). DRP is transported from the Maumee River watershed into Lake Erie and likely drives the HABs. Existing data indicate that the release of dissolved total phosphorus associated with the placement of Toledo Harbor dredged material in the Basin is an inconsequential factor in HAB development.

In 1989, a typical open-lake placement operation involved the release of an estimated 20 to 30 MT of DRP (estimated from settling column tests) from Lake Approach Channel sediments between Lake Miles 2 and 10. Thus, only about 10% of the ultimately available phosphorus is released during the initial placement of dredged material. This represented less than 0.63 percent of the external basin load of DRP estimated in 1980, indicating that 99.4 percent of the DRP load comes from other sources. If it is assumed as an upper limit that open-lake placement of Toledo Harbor dredged material will ultimately release double the amount that is immediately available (i.e., easily desorbable while material is settling through the water column) the resulting percentage of 1.26 is still very small compared to other sources. Further, a USACE letter to OEPA dated October 5, 2009, points out that the Toledo Bay wastewater treatment plant (WWTP) reported a 69.4 ton/year discharge of dissolved total phosphorus compared with 0.77 tons/year calculated as the release of dissolved total phosphorus from open-lake placement of Toledo Harbor dredged material. This indicates that the release of DRP during open-lake placement is very low (about 1%) of the amount released by the WWTP discharge. If it is assumed that the discharge of dissolved phosphorus from the WWTP discharge is much less than that associated with agricultural runoff, this indicates that the contribution of DRP to the Basin from open-lake placement of Toledo Harbor dredged material is miniscule in comparison to other sources.

Dredging and dredged material placement activities would result in the excavation, and some smothering and mortality of benthic macroinvertebrates, and the temporary avoidance of work areas by fish and wildlife species (i.e., mostly gulls and waterfowl). However, following dredging operations, the benthic communities would recolonize the impacted areas. A 2003 benthic community investigation on the open-lake placement area concluded that the diversity and abundance of macroinvertebrates within the area were similar to other reference areas in the Western Basin of Lake Erie. This study also showed that there was no association among sampling areas in relation to their proximity to the placement area, indicating that the placement of dredged material had no measurable long-term effect on the benthic community within or outside the area.

Regarding impacts to fish, the open-lake placement area was situated to avoid fish spawning

grounds. During dredged material placement operations, the modes of impact indicate that adverse impacts to fish are minor and short-term. The increase in suspended sediments and turbidity resulting from the open-lake placement of Toledo Harbor dredged material is very small in comparison to ambient conditions, and is therefore unlikely to trigger any significant adverse effects to fish. Indigenous fish are naturally exposed and have likely adapted to naturally occurring and much more extended elevated suspended sediment events (such as during storm or high runoff events) relative to episodic open-lake placement events. At the open-lake placement area, discharge activities place mud on mud-bottom habitat; therefore, there is no resulting significant change to bottom substrate. The material settles within a few hours and becomes subject to the same resuspension forces typically affecting the surrounding lake bottom. Impacts on fish over the full range of possible effects include either an avoidance or attraction to the area by fish, or no noticeable effect. Some fishes have been observed to be attracted to open-lake placement operations because they have a tendency to feed on the benthic macroinvertebrates contained and released from the dredged material. Many fishes have a wide tolerance for turbidity, and fish behavior in response to a dredged material placement event depends on the species. The placement of dredged material at the open-lake area may result in some mortality to demersal fish eggs (e.g., from broadcast spawning species) existing on the lake bottom in very close proximity to the actual placement of dredged material due to suffocation from burial or siltation, and/or oxygen deficiency at the sediment-water interface. Studies and modeling show that short- and long-term turbidity impacts associated with the open-lake placement of Toledo Harbor dredged material are negligible to minor. Therefore, it would not result in any measureable reduction of light penetration into the water column, or adversely affect phytoplankton and aquatic plant production and fish. Given the dredging period, limited spatial area of impact and natural population variations of these types of species, this type of impact would not culminate in any long-term, adverse impacts to any fish population. The open-lake placement of Toledo Harbor dredged material has a very low likelihood of causing turbidity-related adverse effects on fish, including commercially and recreationally important species such as walleye (*Stizostedion vitreum*) and yellow perch (*Perca flavescens*).

Regarding impacts of open-lake placement of the dredged material on aquatic community structure and function, the aquatic ecosystem in the open-lake placement area, both before and after dredged material placement, is a profundal area within the Basin. It can be appropriately described as silt-bottom, warmwater, eutrophic habitat which supports a variety of benthic and pelagic organisms. Placement of dredged material at the open-lake area creates a mound, which results in some local bottom surface relief. This mound is subject to settling and lake currents in the Basin, which tend to flatten the mound over time following the cessation of dredged material placement operations. Available relevant evidence indicate that the aquatic ecosystem at the open-lake placement area is resilient, and that the periodic disturbance created by open-lake placement of dredged material is absorbed or accommodated by the ecosystem because its structure and function has not fundamentally changed to a different state. Ecosystem resilience signifies ecosystem health (gauged by species diversity) and ecosystem stability (the probability that all species persist).

No impacts to any listed Threatened or Endangered species would occur.

(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*: This alternative involves a reduction in the volume of dredged material and the associated water quality impacts would be similar to those described for the Preferred Design Alternative.

c. Feasibility.

(1) *Preferred Design Alternative*: This alternative is technically feasible, as it involves routine maintenance dredging and dredged material placement procedures. Equipment is readily available to accomplish this type of work. The most recent Benefit/Cost (B/C) ratio for this alternative with respect to commercial navigation in the harbor is greater than or equal to 3.09. Costs of this project would range from $3.50 to 4.00 per cubic yard of dredged material. Although this alternative is the most viable for commercial navigation, recurrent maintenance dredging needs of the Federal navigation channels, as required, would continue to result in a negligible to minor degradation in 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 procedures. Equipment is readily available to accomplish this type of work. The B/C ratio for this alternative with respect to commercial navigation in the harbor is greater than or equal to 3.09. Costs of this project have ranged from $4.00 to $5.00 per cubic yard of dredged material over the past five years. Although this alternative is viable for commercial navigation, recurrent maintenance dredging needs of the Federal navigation channels, as required, would continue to result in negligible to minor reductions in water quality.

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

e. Water Quality Improvement/Recreation Projects. N/A.

f. Water Pollution Control Costs.

(1) *Preferred Design Alternative*: Not dredging 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 would be incurred from water pollution controls.

(3) *Minimum Degradation Alternative*: The cost of adhering to the environmental window for this alternative would be significant. It is estimated that the restrictive environmental window under this alternative will increase the cost of the project by at least about five percent (or $300,000). In addition, not dredging 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. Restricting the placement of dredged material to the northeast half of the open-lake area would result in about a five percent increase in the project cost due the increased dredging cycle time.

g. Human Health Impacts.

(1) *Preferred Design Alternative*: The human health impacts associated with this alternative would be indiscernible, and would not significantly impact the overall quality and value of the water resource. The generation of turbidity and variation in dissolved oxygen levels in the water column would be the major effects associated with the dredging operations. The dredging area is within an industrialized water resource designed for commercial navigation, and a river and bay that are relatively shallow and naturally turbid. PWIs for the Toledo and Oregon PWIs are situated along the south shore of Maumee Bay east of the river mouth, about 7.5 miles south of the existing open-lake placement area. Field monitoring and modeling show that turbidity plumes generated during open-lake placement operations do not migrate far and generally remain within the boundaries of the placement area. The results of an August 2005 preliminary investigation on turbidity plumes relating to the placement of Toledo Harbor dredged material at the existing open-lake placement area in the Basin indicated that the plume migrated in a net northeasterly direction, and westward migration was minimal as it decayed rapidly to background TSS levels near 246 feet to the west of the placement area. Further, at 870 feet (0.17 miles) northeast of the open-lake placed dredged material, only traces of the plume remained as it decayed toward background at a TSS level of 30 mg/L. The maximum plume length was about 1,115 feet (0.21 miles), indicating that the entire footprint remained within the boundaries of the existing open-lake placement area. A subsequent modeling effort in 2007 predominantly showed that only 1.5% of the sediment that is open-lake placed would remain in suspension after four hours, and less than 1% would be expected to remain in suspension after 24 hours. The TSS concentration associated with open-lake placement would be less than 12 mg/L and 1 mg/L above background after four and 24 hours, respectively. Studies and modeling in 2010 show that bottom sediments in the area migrate in a net northeasterly to southeasterly direction, and do not reach Toledo and Oregon PWIs situated along the south shore of Maumee Bay east of the river mouth. Variations and increases in turbidity, and reductions in water quality near the PWIs are substantially influenced (i.e., essentially driven) by the natural wind-driver resuspension of sediments in the nearshore zone and from the Maumee River plume (which can extend 15 miles). The spatial and temporal distribution of violations in state water quality standards at the PWIs point to natural phenomena, such as input from river and nearshore sediment resuspension due to currents and winds, as the principal causal factors. Therefore, the turbidity plumes or sediment

resuspension associated with the placement of dredged material at the open-lake area typically do not reach or affect the quality of water at either the Toledo or Oregon PWIs. The potential of the dredge material placed at the open-lake area to impact the quality of water at these PWIs is very low. A 2009 OEPA Interoffice Memorandum is consistent with this assessment and concludes that it is unlikely that the proposed dredging project and open-lake placement will impact the water quality at these PWIs.

(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*: This alternative involves a reduction in the volume of dredged material and the associated human health impacts would be similar to those described for the Preferred Design Alternative.

h. 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 and ship commercial goods at a competitive cost. As such, it would allow for the cost-effective transport of commodities through the local community. The major products shipped through Toledo Harbor include coal, iron ore, grains, petroleum, limestone, sand and gravel and iron and steel products. This commerce has a substantial positive impact on the local economy by providing jobs that support the transportation, processing and production of these commodities, as well as by maintaining competitive price levels on commercial goods. Existing commercial industry on the harbor supports well over 2,000 blue-collar jobs. This industrial base generates substantial tax revenues for local governments. The estimated annual rate savings provided by Toledo Harbor (savings compared to the costs of alternative modes of transportation, such as rail or truck) is $338 million. The harbor also generates an estimated $126 million in regional revenues and supports 2,126 maritime-related jobs. Construction of the project itself would support about 10-20 blue-collar jobs in the dredging industry for a period of about three to five months. In addition, social and economic benefits associated with recreational navigation would accrue with harbor maintenance.

(2) *Non-Degradation Alternative*: This alternative would involve the cessation of maintenance of harbor Federal navigation channels. However, benefits would accrue to recreational navigation until the channels shoal in such that 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*: This alternative would restore navigable depths in the harbor channels for commercial vessel traffic. The social and economic benefits generated as a result of this alternative would be similar to those associated with the Preferred Design Alternative. A large industrial base depends on the harbor to receive and ship commercial goods at a competitive cost. As such, it would allow for the cost-effective transport of commodities

through the local community. The major products shipped through Toledo Harbor include coal, iron ore, grains, petroleum, limestone, sand and gravel and iron and steel products. This commerce has a substantial positive impact on the local economy by providing jobs that support the transportation, processing and production of these commodities, as well as by maintaining competitive price levels on commercial goods. This industrial base generates substantial tax revenues for local governments. The estimated annual rate savings provided by Toledo Harbor (savings compared to the costs of alternative modes of transportation, such as rail or truck) is $338 million. The harbor also generates an estimated $126 million in regional revenues and supports 2,126 maritime-related jobs. Construction of the project itself would support about 10-20 blue-collar jobs in the dredging industry for a period of about three to five months. In addition, social and economic benefits associated with recreational navigation would accrue with harbor maintenance.

i. Social/Economic Benefits Lost.

(1) *Preferred Design Alternative*: This alternative would not result in any significant reduction in the economic value of the Basin through use for recreation, tourism and enjoyment by humans. Negligible to minor, short-term degradations in water quality associated with this alternative, such as that associated with turbidity in the water column, would be aesthetically displeasing and may not be attractive to recreational boaters in the area. Recreational and commercial fishing activities in the vicinity may be temporarily negatively affected by temporary degradations in water quality. Except for commercial industries such as restaurants and other riparian retail establishments, the temporary degradation in water quality would have minimal negative effects on commercial activities. Studies and modeling show that short- and long-term turbidity impacts associated with the open-lake placement of Toledo Harbor dredged material are negligible to minor. Further, existing data indicate that open-lake placement of this dredged material has a very low potential to influence HABs.

(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 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 economically navigate the harbor due to decreased channel 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 provide competitive price levels on local commercial goods delivered by water because water delivery of these products will have ceased. If the harbor were not dredged and is no longer available to commercial navigation traffic over time, commodities would need to be moved by alternative modes of transportation, such as rail or truck. The transportation costs associated with these goods would then increase by $338 million annually, which is the estimate of rate savings benefits that the maintained port currently provides. In addition, it is estimated that there would be a loss of $126 million in regional revenues and 2,126 maritime-related jobs. Since the industrial base on the harbor would likely close down, all tax revenues in this regard would be

lost. The lack of maintenance dredging would result in the loss of about 10 to 20 blue-collar jobs in the dredging industry for a period of about three to five months.

(3) *Minimum Degradation Alternative*: This alternative would not result in any significant reduction in the economic value of the Basin through use for recreation, tourism and enjoyment by humans. Negligible to minor, short-term degradations in water quality associated with this alternative, such as that associated with turbidity in the water column, would be aesthetically displeasing and may not be attractive to recreational boaters in the area. Recreational and commercial fishing activities in the vicinity may be negatively affected by temporary degradations in water quality. Except for commercial industries such as restaurants and other riparian retail establishments, the temporary degradation in water quality would have minimal negative effects on commercial activities. Studies and modeling show that short- and long-term turbidity impacts associated with the open-lake placement of Toledo Harbor dredged material are negligible to minor. Further, existing data indicate that open-lake placement of this dredged material has minimal potential to influence HABs.

j. Environmental Benefits Lost/Gained.

(1) *Preferred Design Alternative*: Refer to water quality impacts evaluation for "Preferred Design Alternative," relative to Question 10(b) of this application. This alternative would result in a short-term, minor reduction of water quality in the receiving waters. Testing and evaluation indicates that placement of the dredged material at the authorized open-lake area would not significantly impact aquatic life. Open-lake placement of the dredged material constitutes internal loading and does not result in a net increase of sediments into the Basin. The receiving waters are naturally turbid; the main water quality impacts would be the generation of turbidity and variation of dissolved oxygen levels in the water column. These impacts would be short-term and spatially limited. Turbidity would not increase to an extent that it would result in any measureable reduction of light penetration into the water column, or adversely affect phytoplankton and aquatic plant production and fish. Discharge of the dredged material at the open-lake placement area would have a very low potential to influence HABs in the Basin due to very small releases of DRP to the water column. Dredging and dredged material placement activities would result in the excavation, smothering and mortality of benthic macroinvertebrates. Following dredging operations, benthic communities would recolonize the impacted areas. The open-lake placement area is located to avoid any significant fish spawning areas. The fish community is generally adapted to natural levels of turbidity in the Basin and open-lake placement of the dredged material would not significantly increase ambient turbidity levels over the long-term. Fishes may avoid or be attracted to open-lake placement events, or may not show any noticeable effect; they would return following the completion of dredging operations. The aquatic ecosystem at the open-lake placement area is resilient. The periodic disturbance created by open-lake placement of dredged material is absorbed or accommodated by the ecosystem because its structure and function has not fundamentally changed to a different state. Wildlife species (i.e., mostly gulls and waterfowl) would temporary avoid work areas and would return following the completion of dredging operations. No effects to any listed Threatened or Endangered 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*: This alternative involves a reduction in the volume of dredged material and the associated environmental benefits lost/gained would be similar to those described for the Preferred Design Alternative.

k. 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 and discharge 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*: Dredging would be restricted to between 1 July and 30 November in order to minimize impacts to local environmental resources, primarily fisheries. Dredged material placement would be restricted to the northeast half of the open-lake area. Dredging will not be performed during Lake Erie storm events. Care would be employed throughout the course of the dredging and discharge operations to avoid the creation of unnecessary turbidity that may degrade water quality or adversely affect aquatic life outside the project area.