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FINAL ENVIRONMENTAL STATEMENT, SEBEWAING RIVER, MICHIGAN, OPERA--ETC(U)
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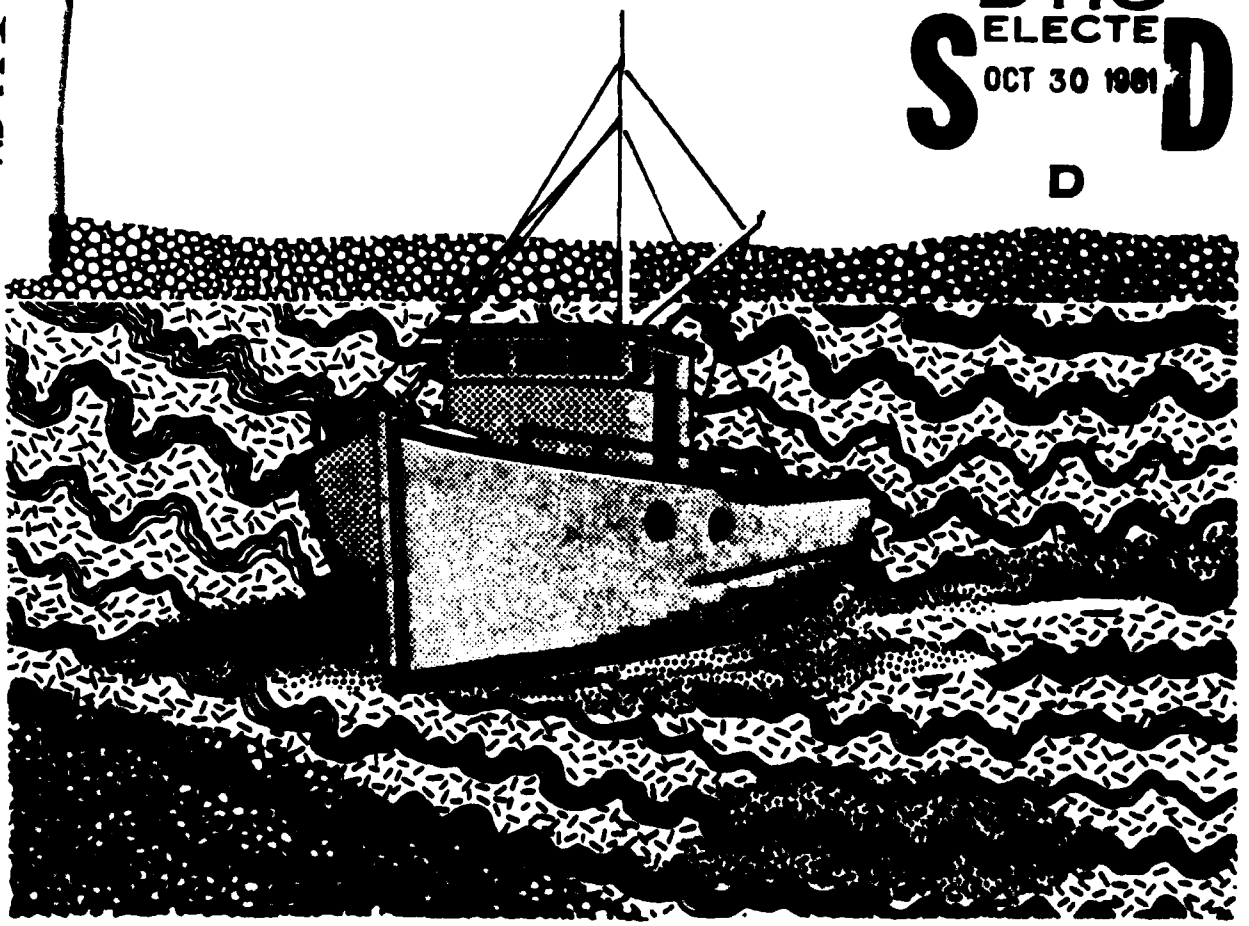
Final Environmental Statement

SEBEWAING RIVER, MICHIGAN

OPERATION & MAINTENANCE, CONFINED DISPOSAL FACILITY & FLOOD CONTROL FACILITIES



U.S. Army Corps of Engineers

Detroit, Michigan

APRIL 1978

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1 REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A116 971	
4 TITLE (and Subtitle) Final Environmental Statement Seebewaing River, Michigan Operation & Maintenance, confined disposal facility & flood control facilities.		5 TYPE OF REPORT & PERIOD COVERED Final Report
		6 PERFORMING ORG. REPORT NUMBER
7 AUTHOR(s) U.S. Army Engineer District Detroit		8. CONTRACT OR GRANT NUMBER(s)
9 PERFORMING ORGANIZATION NAME AND ADDRESS Department of the Army U.S. Army Engineer District, Detroit P.O. Box 1027, Detroit, Michigan 48231		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11 CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE April 1978
		13. NUMBER OF PAGES 117 (various pagings)
14 MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16 DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17 DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18 SUPPLEMENTARY NOTES

19 KEY WORDS (Continue on reverse side if necessary and identify by block number)

20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

FINAL ENVIRONMENTAL STATEMENT
SEBEWAING RIVER, MICHIGAN
OPERATION AND MAINTENANCE, CONFINED DISPOSAL FACILITY,
AND FLOOD CONTROL FACILITIES

13,172

Prepared by:
U. S. Army Corps of Engineers
Detroit, Michigan
April 1978

420344

SUMMARY

SEBEWAING RIVER, MICHIGAN

OPERATION AND MAINTENANCE OF NAVIGATION,

CONFINED DISPOSAL FACILITY,

AND FLOOD CONTROL FACILITIES

( ) DRAFT (X) FINAL ENVIRONMENTAL STATEMENT

RESPONSIBLE OFFICE: U.S. Army Engineer District, Detroit
Corps of Engineers
P.O. Box 1027
Detroit, Michigan 48231
Phone (313) 226-6752

1. NAME OF ACTION: (X) ADMINISTRATIVE ( ) LEGISLATIVE

2. DESCRIPTION: The proposed Federal action includes maintenance dredging of the Sebewaing River navigation and flood control channel, construction of a confined disposal facility for contaminated dredge material, repair of stop-logs and other structures forming the flood protection project, maintenance of navigation structures protecting the channel, and, as necessary, dynamiting the ice jams to prevent flooding of the Village of Sebewaing. Maintenance dredging of the river is required at infrequent intervals to insure the continuance of adequate depths for vessels using the river. Maintenance of the structures is required occasionally to insure that the proper stability is available when needed for protection from flooding, wave action, or inaccurate navigation. Materials dredged from the uncontaminated portion of the navigation channel will be placed onshore, and in an open water site in Saginaw Bay. Materials dredged from the contaminated portion of the navigation channel would be placed into a confined disposal facility. The proposed site is situated south of the Sebewaing River on the Saginaw Bay shoreline, owned by Sebewaing Township.

3. (a) ENVIRONMENTAL IMPACT: Dredging and disposal activities will have temporary adverse effects on water quality, organisms living in and on the bottom sediments in affected areas, aesthetics, recreational fishing, and the ability of the area to support aquatic life. Beneficial impacts of maintenance dredging include continuance of

the existing flood carrying capacity of the river and continuance of the existing local economy through preservation of navigation dependant commercial enterprises. Maintenance of existing flood control facilities may have temporary adverse effects on water clarity, vegetation on levees, and small animals residing in and on the facilities. Beneficial effects include keeping the structures in aesthetically pleasing, functioning condition, thereby reducing the threat of flooding in the Village of Sebewaing. Dynamiting activities can temporarily impact local fish populations, killing some fish outright and causing others to leave the area. Benefits attributed to dynamiting are essentially the social and economic benefits derived from elimination of flooding caused by ice jams. Filling upland portions of the proposed diked disposal site would create land with higher economic potential. Contaminated materials would be removed from the navigation channel.

(b) ADVERSE ENVIRONMENTAL EFFECTS: Water quality may be temporarily impacted by several of the proposed activities. The impact will be essentially limited to turbidity. Recreationalists may be temporarily inconvenienced while the activities are being conducted, but no long-term effects are expected. The apparent, most substantial impact of the combined activities would be continuation of assumed, existing low productivity levels in affected areas.

4. (a) ALTERNATIVES: Alternatives considered for proposed actions are summarized below.

(b) Dredging: Alternatives to the proposed dredging include utilization of other types of dredges, stopping all dredging, and dredging to lesser depths. Although establishment of sedimentation control programs would aid in mitigation of adverse effects attributed to the proposed action, such programs cannot be considered as true alternatives.

(c) Disposal of Non-Contaminated Dredged Material: The alternatives include disposal north and south of and parallel to the channel, in open water in Saginaw Bay, in nearshore waters, on land, and confined disposal. Although it is not a true alternative, the possibility of pre-treating materials prior to disposal has also been considered.

(d) Disposal of Contaminated Dredged Material: Alternate disposal methods considered are confined disposal on upland sites, pretreatment of material, creation of marshlands to replace those lost through disposal on wetland, and no action. The ultimate solution depends on adequate control of soil runoff and reduction of contaminants from municipal and commercial discharge.

(e) Maintenance of Structures: The only true alternative to maintenance of structures related to the navigation and flood control projects is to terminate maintenance. This would result in eventual deterioration of the structures to the point where they would no longer serve their purpose, and the value of the navigation channel and flood control project would be impaired or lost.

(f) Dynamiting of Ice Jams: Alternatives include "no action" which would result in serious flooding problems, or use of other means of breaking up the jams. The only known potential means for breaking up jams without explosives is the use of icebreaking vessels, and this alternative has been found impracticable at this time. Prevention of the formation of ice through the use of bubbler or heated water discharges to the river was considered and eliminated because of unfavorable economic and engineering determinations.

5. COMMENTS RECEIVED:

U.S. Department of Commerce, NOAA
U.S. Department of Transportation, Federal Highway Administration
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of Agriculture, Forest Service, Soil Conservation Service
U.S. Environmental Protection Agency
State of Michigan, Department of State, Michigan History Division
State of Michigan, Department of Natural Resources
Michigan United Conservation Clubs.

6. DRAFT STATEMENT TO CEQ November 1977

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SEBEWAING RIVER, MICHIGAN
OPERATION AND MAINTENANCE OF NAVIGATION,
CONFINED DISPOSAL FACILITY,
AND FLOOD CONTROL FACILITIES

1. PROJECT DESCRIPTION

1.01 General. The proposed Federal action is the continued operation and maintenance, as required, of an existing navigation and flood control channel, appurtenant structures, and flood control facilities on the Sebewaing River in Michigan. This includes the construction and operation of a confined disposal facility for dredged materials from that portion of the navigation channel designated by EPA as contaminated and unsuitable for open water disposal. A secondary action proposed is the continued use of dynamite to break up ice and ice jams on the river to prevent flooding in residential areas. These activities are proposed because they are considered essential to the social, environmental, and economic well-being of the local population and, to a lesser extent, the general public. The proposed actions are described in detail in subsequent paragraphs.

1.02 Navigation Channel and Structures. The existing Federal navigation channel in the Sebewaing River requires periodic maintenance dredging to remove shoals which would eventually reduce the ability of the river to support vessel traffic. Because of the need for a confined disposal facility for contaminated dredge materials, the channels have not been maintained in the past several years. The breakwater provides partial protection for the navigation channel from increased littoral drift, and the flood control structures protect the Village of Sebewaing from flooding. Dynamiting of winter ice jams is conducted as part of the flood protection project scheme.

1.03 Project Features and Authorization. The existing navigation project (Figure 1) was authorized by the River and Harbor Act of June 3, 1896 and provided for extending the channel to the 8-foot contour in Saginaw Bay, a distance of about 15,000 feet, and increasing its width to 100 feet and its depth to 8 feet. This project was completed in 1903.

A channel improvement project to protect the Village of Sebewaing and vicinity from flooding was authorized by the Flood Control Act approved 18 August 1941 and provides for these improvements and their operation and maintenance (Figure 2):

a. Enlarging the channel of the Sebewaing River to a 70-foot bottom width from the State and Columbia Drains to the outlet at Saginaw Bay, a distance of about 11,000 feet. and deepening it to 8 feet.

b. Altering three highway bridges and one railroad bridge so their waterway clearance area can pass the design flood and reduce the ice-jam hazard.

c. Constructing levees and flood walls along low-lying areas.

This project was completed in 1948 by contract, except for the removal of a small earth levee on the south bank.

1.04 The Corps of Engineers, authorized by the River and Harbor Act of 2 March 1945, is responsible for periodic maintenance dredging of specifically authorized waterways. Dredging serves to allow shipping, fishing, and boating to continue, which in turn benefits both the public and commercial interests.

1.05 Maintenance dredging projects are reviewed and evaluated under the following laws: the Federal Water Pollution Control Act of 1972; the National Environmental Policy Act of 1969; the Fish and Wildlife Act of 1956; the Marine Protection, Research and Sanctuaries Act of 1972; and the Endangered Species Act of 1973, as well as the various Congressional Acts authorizing construction and maintenance of the Federal Project.

1.06 The disposal of dredge material unsuitable for open water disposal in containment facilities was authorized under the River and Harbor Act of 1970, Public Law (P.L.) 91-611, Section 123. This provides for the construction, operation and maintenance of a disposal facility having a 10 year capacity. The Regional Administrator of the U.S. Environmental Protection Agency (EPA) is authorized to determine whether sediments are to be confined. Furthermore, in 1970, Governor William Milliken requested that material unsuitable for open water disposal not be placed in the open waters of Michigan.

1.07 Public Law 91-611 states that prior to construction of any such facility, the appropriate State or States, interstate agency, municipality, or other appropriate political subdivision of the State shall agree in writing to: (1) furnish all lands, easements and rights-of-way necessary for the construction, operation, and maintenance of the facility; (2) hold and save the United States free from damages due to construction, operation, and maintenance of the facility, except for negligence; and (3) maintain the facility after completion of its use for disposal purposes in a manner satisfactory to the Secretary of the Army.

1.08 The appropriate non-Federal interest or interests agree to contribute 25 percent of the construction costs of the confined disposal

facility unless payment of those costs is waived by the Secretary of the Army upon a finding by the Administrator of the Environmental Protection Agency that the area to which such contribution applies is meeting applicable water quality requirements and standards.

1.09. Operation and Maintenance Activities. The following descriptions cover the proposed activities for the Sebewaing River.

a. Dredged Materials

1.10 Maintenance dredging was performed in 1968 when 70,235 cubic yards of sediment were removed. In 1977 emergency dredging removed 14,000 cubic yards (See Environmental Assessment, Emergency Dredging, Sebewaing Harbor, Michigan, Appendix G; data also found in this statement are not included). The upstream river channel is characterized by sand and gravel, while the lower reaches of the river navigation channel contain silts, clay and organic matter (bark, twigs). The outer navigation channel contains sandy material.

1.11 The U. S. Environmental Protection Agency (U.S. EPA), and its forerunner, the Federal Water Pollution Control Administration (FWPCA), investigated the sediments from the navigation project in 1970, 1972, 1974, and 1975 (Table 1, Figure 8). The current U.S. EPA classification indicates the sediments in the navigation channel from the C & O railroad bridge to river mile 0.6 are moderately contaminated. Sediments from river mile 0.6 to river mile 0.0 are classified as heavily contaminated, and sediments from the river mouth to the outer lake project limits are classified as uncontaminated. Sediments classified as moderately or heavily contaminated are unacceptable for open water disposal. The contamination problem with the sediment unacceptable for open water disposal is basically one of high organic nutrient concentration. Since sediments in the navigation and flood control channel are considered unacceptable for open water disposal, any materials dredged from areas so designated must be placed within confining levees to prevent return of contaminants to the waterway.

b. Dredging Operations

1.12 Channel maintenance consists of a series of specific operations that are conducted in order to identify and remove materials that have entered the authorized project channels. A sounding survey is periodically conducted to determine the location and amount of channel shoaling. Depending on weather conditions, the survey generally takes about one week to complete. Shoaling information is gathered by sounding equipment on a survey launch boat, and the recorded

information is used to prepare harbor maps that display channel depths in the project area. Harbor maps showing the results of past sounding operations at Sebewaing Harbor are available for review at the Detroit District Office. Sounding operations in Sebewaing Harbor channels are performed by the Detroit District using Corps equipment.

1.13 A condition survey of the navigation project at Sebewaing dated June 1977 revealed a current backlog of approximately 34,000 cubic yards of shoaling which was unsuitable for open lake disposal.

1.14 After the navigation channels have been surveyed, dredging activities are conducted to remove channel shoals that have decreased channel depths to levels that are less than the authorized depths. Because of the need for a confined disposal site, the channels have not been maintained in the past several years. Sites considered acceptable for disposal of the materials have recently been selected. The selection was coordinated with appropriate agencies, including the U.S. Fish and Wildlife Service, EPA, the Michigan Department of Natural Resources, and local governmental agencies.

1.15 Because dredging could not be accomplished until a site was selected and made available, the channel has become virtually blocked to the passage of larger recreational vessels. Controlling depth in the channel is currently two (2.0) feet in the outer portion. Controlling depth was increased to four (4.0) feet in the inner portion after emergency dredging. Maintained channel dimensions are eight (8) feet deep and seventy (70) feet wide in the navigation channel. Depths are referenced to I.G.L.D. of Lake Huron.

1.16 A fully developed confined disposal facility will not be available before late FY 79. Restoration, under normal procedures, of usable channel depths within the inner portions would be subsequent to that date. Removal of the critical shoaling over the larger outer section has not yet been scheduled. Emergency dredging of the extreme shoals in the inner section was accomplished in September 1977 for flood control purposes (See Appendix G). Contaminated material removed was deposited within an earthen dike on Sites A-1 and A-2 adjoining the airport. In addition to filling the marginally valuable marsh area approved by the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service, some additional footage was taken through misplacement of the dike; the dike has been relocated to the correct position since that time and the wetland elevation restored (See Figure 5).

1.17 Large, deep-draft, commercial harbors that are maintained by the Detroit District, such as Cheboygan Harbor, Saginaw, and Alpena, are normally dredged by the Corps using a Corps hopper

dredge. The hopper dredge requires a minimum 13 foot draft and the authorized project depth at Sebewaing is only 8 feet. Other types of dredges used for the maintenance of shallow draft commercial harbors are the pipeline and bucket dredges.

1.18 After dredging operations have been completed, the channels are resounded to check post-work channel depths. Post-dredging sounding and clearing operations are performed by the Detroit District.

1.19 Dredging occurs on an "as needed" basis when channel soundings indicate that shoals may interfere with the safety of vessels, or when sufficient shoaled materials exist to economically justify movement of a dredge to Sebewaing Harbor. This normally occurs every fourth to sixth year.

1.20 In 1968, maintenance dredging of Sebewaing Harbor was performed with the removal of a total of 70,235 cubic yards (cy). These sediments were removed from the entire project channel, extending from the 8 foot contour to the upstream project limits, a total of about 15,000 feet.

1.21 For flood control purposes, the hydraulic dredge U.S. Depoe Bay performed emergency dredging in September 1977, removing 14,000 cubic yards of material in the area of the channel classified as contaminated. The material was pumped into an emergency diked enclosure suitable for diposal of contaminated dredged materials. The area is a portion of the major disposal facility to be built later for maintenance dredging which would inclose the area used for the emergency work (Figure 5).

c. Disposal Operations

1.22 In past years, dredged sediments removed from Sebewaing Harbor were disposed in open water dumping grounds located over 3 miles west of the river mouth. In 1970, the deep water disposal practice for contaminated sediments was discontinued to comply with the Governor of Michigan's request that contaminated dredged material not be placed in open water.

1.23 Disposal of the uncontaminated dredged material will be in the open waters of Saginaw Bay (2600 feet x 2600 feet), 2 1/4 miles (320°) from Buoy RN2 (Figure 4).

1.24 Sites considered acceptable for disposal of contaminated materials have recently been selected. Proposed sites are shown in Figure 5. All contaminated dredged material would be deposited in Site A-1, located approximately 420 feet north of the paved runway at

Sebewaing Airport between a small boat canal and Saginaw Bay. The proposed containment facility would ultimately encompass an area approximately 9 acres in size. It would extend the present north-south airport runway approximately 1200 feet to the Sebewaing River, 150 feet on each side of the extended centerline. The remaining area within the diked enclosure would be excavated approximately five and a half feet in order to accommodate the current backlog and the 10-year maintenance dredging volume (84,000 cubic yards). Earthen dikes surrounding the area would be approximately 5 feet above existing ground levels and would have a clay core from selected excavated material from the site. This would prevent possible seepage of effluent from the dredged materials placed in the facility.

1.25 Material excavated from Site A-1 could be deposited on Sites A-3, A-4 and L (Figure 5). Sites A-3 and A-4 are low areas east of the Sebewaing Airport airstrip and could be used jointly. Site L is an upland site located on the Sebewaing wastewater treatment plant. The excavated material, constituting the present top soil of the area, has been tested (Appendix C) and has potential use as a soil supplement.

d. Dredging Equipment

1.26 The containment facility would be provided with a mooring facility faced with sheet piling along the Sebewaing River. The scows that have been filled by a dredge in the channel would be moved by work boat to the mooring facility. The existing channel would be widened to the shoreline at the mooring facility to provide an access area. A land-based crane with clamshell would place the material into the diked disposal area from the scows. The dredged material would then be spread by a bulldozer or end loader into its final location. With the use of a hydraulic dredge, material would simply be pumped into the facility. Any effluent from the area would be released to the Sebewaing River through a weir structure equipped with an oil and debris skimming arrangement.

1.27 For general maintenance dredging, two types of dredges are commonly used for the maintenance of shallow draft harbors. They are the hydraulic pipeline-cutterhead dredge and various bucket type dredges (See Figure 3).

1.28 The pipeline-cutterhead dredge is primarily used for excavating and moving material hydraulically to another location. The dredge is equipped with a powered cutterhead at the suction line to break up dense material and create a slurry that can be more readily transported. The cutterhead and suction pipe are mounted on a

ladder frame that is pivoted about the front of the dredge for vertical movement. Two spuds are provided at the stern of the dredge and swinging cables are used to pivot the vessel around. By alternating the raising of the spuds, the dredge excavates transversely across the area.

1.29 A bucket dredge is a mechanical type of dredge that requires auxiliary equipment, such as scows and tugs, to receive the dredged material and transport it to the disposal site. Bucket dredges include the backhoe, dipper, dragline, ladder, and grab, the latter having two kinds: clamshell and orange peel buckets. The dredging equipment is located in the stern of a barge which is equipped with two pin-up spuds mounted in the forward part of the hull to lift the vessel above its normal flotation point and to absorb reactions caused by the digging.

e. Structure Repairs

1.30 Sight inspections of the flood control project are conducted every year. To date, no action has been taken to fill any eroded areas, repair any of the structures, or place any riprap on the areas now needing attention. (This project's maintenance has not been accomplished by local authorities as no local body is committed to the Corps of Engineers for operation or maintenance responsibilities or fiscal commitments).

1.31 In 1968, stop logs in the flood gates were replaced. An additional replacement is currently in progress. In 1980 and 1981, a detailed engineering survey is planned, to be accompanied by the repair of the dikes adjoining and near the bridges. This work would include fill of eroded areas and placement of riprap.

f. Dynamiting Ice Jams

1.32 The Village authorities dynamite the ice and ice jams if conditions exist that threaten the area with flooding. This activity has been going on for about 30 years and is accomplished under supervision of the Superintendent for Power, Light, and Street Development of the Village of Sebewaing. Holes are drilled in the ice and nitrogel dynamite is used as the explosive to crack the ice and allow the smaller pieces to flow down the channel. Dynamiting is done only when conditions are correct for successful operations. These include: 1) River ice is greater than 12 inches, 2) spring thaw has commenced, carrying increased water down the channel, 3) winds prevail from the east to carry the flows to the lake. This is part of the operation and maintenance of the flood control project, which is a Corps responsibility.

1.33 Federal Costs. A benefit-cost ratio for maintenance dredging is an intangible value and difficult to quantify. It varies from year to year, depending upon the quantity of materials dredged, the value of products shipped, and the recreational usage of the harbor. A benefit/cost ratio is not normally prepared for operation and maintenance work for several reasons. Once a project has been constructed, its continued benefit to the public depends on maintenance justified in the original project authorization. Annual budget requests prepared by the District Engineer include a careful evaluation and justification of anticipated maintenance. Additionally, consideration must be given to those existing facilities, such as commercial fishing establishments and recreation oriented marinas, which depend on continued navigation of the harbors and channels. Failure to maintain navigable waterways in such areas can cause the loss of investments made in such facilities, loss of employment, and a substantial adverse economic impact. Maintenance dredging was conducted in 1968 when 70,235 cubic yards of material were removed at a cost of $50,890 or about $0.70 per cubic yard. Flood protection also requires maintenance of the channel.

The total Federal costs for the navigation channel as of 30 June 1976 were:

	EXISTING PROJECT	PREVIOUS PROJECT
New Work	$ 35,573	$15,000
Maintenance	323,872	0
Total Costs	$ 359,445	$15,000

1.34 In the last 10 years, minor repairs to the flood structures (replacement of the stop logs in flood gates) were accomplished once, in 1968 for about $1,100. This activity is tentatively scheduled again in 1977 for an estimated $2,500 expenditure.

1.35 It has been necessary during 7 of the last 10 years to have the river ice dynamited in order to prevent flooding of the Sebewaing River. This is a part of the flood protection project work. A total of $8,451 (Table 1) has been expended by the Corps for this activity during this period.

Table 1
Ice Jam Dynamiting Expenditures

Year	Cost	Year	Cost
1967	$1,023	1972	$1,406
1968	1,055	1973	0
1969	1,242	1974	0
1970	1,201	1975	0
1971	1,122	1976	1,402

2. ENVIRONMENTAL SETTING OF THE PROJECT AREA

2.01 General Area Description. Sebewaing Harbor is located on the shore of Saginaw Bay, the largest indentation on the western shore of Lake Huron. The closest deep-draft harbor is Saginaw River and Harbor, located 15 miles to the southwest. Bay Port Harbor, a shallow draft commercial harbor, is located 11 miles north. The harbor mouth at Sebewaing is partially protected from southwest winds by Fish Point, and a string of islands help break the wind and waves from the northwest.

2.02 The Sebewaing River is a small stream that flows through the Village of Sebewaing and is formed by the confluence of the Columbia and State Drains, about 2 miles above the rivermouth.

2.03 In its original condition, the river below Sebewaing had a crooked, shallow channel with an available depth of about four feet. In 1929 and 1930, the channel was straightened, widened, and deepened by private enterprise, and the dredged material was deposited along the channel banks, resulting in a confined channel that extended about 4,000 feet downstream from the railroad bridge and into Saginaw Bay. By authority of the 1941 flood control project, the bridges spanning the river were rebuilt, reconstructed, raised and lengthened. Steel and concrete revetments were constructed along critical erosional sections of the riverbanks by the Corps. All flood control structural work was completed by 1947.

2.04 The watershed formerly had large numbers of woodland and wetland areas, although many of the forests have been cut and wetlands drained, thus exposing the prime agricultural land for crop production. No recreational lakes or impoundments are located in the drainage basin except near the river mouth.

2.05 Hydrology. The average annual water levels in Saginaw Bay are controlled by the Lake Huron water level and are a function of water inflow from Lakes Superior and Michigan, outflow through St. Clair River, and annual climatology. Water levels at the Sebewaing River fluctuate with the level of Saginaw Bay. Within a one-year period, the monthly average levels do not vary much from the high summer levels to the low winter levels. Saginaw Bay is subject to sudden changes in wind. A northeast gale can drive water into the bay so as to raise the water level at the mouth of the Saginaw River 3 to 4 feet in less than as many hours and causes a similiar, but lesser, increase at Sebewaing (5). A southwest wind lowers the level, resulting in levels decreasing at the tributaries and harbors. During the

76 years from 1900 through 1975, the difference between the highest (581.04) and the lowest (575.35) monthly means stages, recorded at Harbor Beach, Michigan, has been 5.69 feet; the greatest annual fluctuation as shown by the highest and the lowest monthly means of any year was 2.21 feet; and the least annual fluctuation was 0.36 foot. Water levels are referenced to the low- water datum plane for Lake Huron which is elevation 576.8 feet above the mean water level at Point-au-Pere (Father Point), Quebec, on International Great Lakes Datum (1955).

2.06 The Sebewaing River Basin is roughly trapezoidal in shape and drains an area of about 110 square miles. Stream flow records of the State of Michigan, from 1940 to 1954, show the average discharge of the Sebewaing River near Sebewaing was 37.3 cubic feet per second. The stream gradient drop is steep, 3.3 feet per mile, in the downstream stretch of the river.

2.07 Geography. The topography of the Sebewaing River Basin is the result of the wave action of the prehistoric lakes upon the deposits of glacial till left by the retreat of the ice sheet that once covered at the area. The slope of the land in the drainage basin is not uniform but is broken by occasional low sand ridges and almost level areas. In general, the land surface has very little relief.

2.08 The land along the shore of Saginaw Bay in the vicinity of the Village of Sebewaing is principally belts of sandy soil laid down by currents along the shores of the ancient lakes. Because of the previous high water table and poor natural drainage of the Sebewaing River Basin, the soil was not considered valuable for agriculture. Construction of an extensive drainage system has remedied this situation and practically all of the area is now under cultivation. The predominating and most valuable soil of the area is a very dark-gray or black alkaline loam or clay-loam.

2.09 Geology. Geologically, Saginaw Bay has been considered a shallow extension of Lake Huron formed during the Pleistocene epoch. As the lake receded to its present boundaries, it exposed lacustrine sediments which are marked by today's sand beaches. The bay cuts into a large formation of bedrock, primarily limestone and sandstone from the Mississippian and Pennsylvanian periods. It is unlikely, however, that these preglacial rocks contributed significantly to the present sediment structure of Saginaw Bay. Most of these sediments have been removed by currents, and bare rock has been exposed by wave action. The Pleistocene glacial till defines the majority of todays bottom material. These deposits of quartz, sand, gravel, and silt have, by now, been locally shifted and sorted by bay currents. Extensive sandy

flats exist south of Wildfowl Bay and west from the Saginaw River to Point Au Gres.

2.10 Climatology. The climate of the Sebewaing River area is modified by the Great Lakes which warm the air in winter and cool it in summer. The climate is typical of the entire Great Lakes coastal areas and can be described as having a wide seasonal variation, many storms, a relatively high humidity, and a fairly constant yearly precipitation distribution. The mean yearly precipitation is recorded as 28 inches with a winter snowfall of 31 inches. The mean annual temperature is 47°F, with a frost free season from early May until late September, and a growing season of about 150 days.

2.11 Demography. The Village of Sebewaing is located at the mouth of the Sebewaing River and provides supporting businesses for the primarily agricultural area. A few small industries and a sugar beet processing plant are located at Sebewaing.

2.12 The population of the Village of Sebewaing was 2,026 persons in 1960 and 2,053 in 1970, an increase of 1.3 percent, whereas Sebewaing Township experienced a 1.8 percent decline from 3,218 in 1960 to 3,160 (12). During this 10 year period, Huron County remained virtually the same, showing a 0.2 percent population increase from 34,006 to 34,083.

2.13 In Huron County, the population has been projected to decline to 31,765 by 1980 and to 29,110 by 1990. This decline in population will result from the migration of agricultural and city workers to the industrial cities, where increased employment opportunities and higher pay are available.

2.14 The Sebewaing River Basin is mainly an agricultural community, and the principal natural resource is the excellent farm land for raising navy beans, sugar beets, grain, grapes, and berries. About 96 percent of all the navy beans grown in the United States are from Michigan, and most of these are from Huron County (21). Some of these crops are destined for foreign commerce and are shipped overseas from the deep draft Saginaw River Harbor located 14 miles southeast.

2.15 Waterborne Commerce. Prior to 1908, when truck transportation began domination of the shipping mode at Sebewaing, the waterborne commerce was relatively active, totaling over 190,000 tons in 1897 consisting of over 320,000 bushels of grain, 1,000,000 board feet of hardwood lumber, and 62,000 tons of soft coal. From the mid 1800's, commercial fishing in Saginaw Bay expanded in response to the demands of the increasing population and the onset of the industrial revolution, peaking in 1902 with about 7,100 tons of fish, consisting mainly of walleye (Stizostedion vitreum), yellow perch (Perca flavescens), sturgeon (Acupenser sp.), whitefish (Coregonus spp.) and herring (Clupeidae). The total catch has declined due to the change in species composition caused by the sea lamprey (Petromyzon

marinus), alewife (Alosa pseudoharengus), pollution, habitat changes, water quality degradation, and over-fishing.

2.16 Present commerce is limited to fresh fish, mainly yellow perch (Perca flavescens), suckers (Catostomidae), pumpkinseed sunfish (Lepomis gibbosus), and carp (Cyprinus carpio). Fish catch records are tabulated in Table 2 showing the tonnage for the last 10 years.

TABLE 2

Sebewaing Harbor Fish Catch
1965-1974

Year	Catch (in tons)	Year	Catch (in tons)
1965	26	1970	32
1966	51	1971	19
1967	32	1972	24
1968	none reported	1973	20
1969	26	1974	27

2.17 In 1973, 604 vessel trips of less than 5 feet were recorded for the river harbor. Commercial fishermen transported 24 tons of fresh fish through the harbor during the same year. In 1976, a shoal formed at the river mouth and reduced water depths to approximately 2 feet. This curtailed boater use in the upstream navigation channel for all but the shallowest draft recreational vessels. A minimal number of commercial and recreational vessels are using the waterway.

2.18 Recreation. Although the Thumb Area is a relatively isolated area and has escaped overdevelopment, the proximity to several metropolitan areas may reverse this trend. Several factors may encourage recreational resources to improve, expand, or develop, such as: 1) highway improvements, 2) energy conservation efforts encouraging local travel, 3) shorter work weeks, 4) continued planting of fish by the Fisheries Division of the Michigan DNR, and 5) an increased need for water recreation areas. The character of the shoreline changes greatly as one travels the western outer edge of the Thumb from Bay City to Point Aux Barques: marshes to low bluffs to low sand dunes to low rock bluff. Potential recreation developments, such as scenic turnouts and picnic areas, waterfowl hunting areas, guide services, boat rentals and water related supply shops, could utilize the existing natural shoreline.

2.19 Major county wide recreational activities include fishing, snowmobiling, and upland and waterfowl small game hunting. Boating and fishing are also major recreational activities in the harbor area.

2.20 Boat registration for the entire State of Michigan in 1974 was over 534,000 pleasure craft, with about 2,020 registrations from Huron County (13). Only one launching site is found on the Sebewaing River. This is operated by the Village of Sebewaing and is located on the South side of the river, immediately downstream of the C&O Railroad Bridge. The boat launching facility is 4 acres in size, contains picnic, playground, parking, and sanitary facilities as well as a three lane boat launching ramp. Financial assistance for purchasing part of the land and for developing the area was provide through the Bureau of Outdoor Recreation's Land and Water Conservation Fund, Project 26-00449. During 1974, a total of 590 vessels, drafting 5 feet or less, utilized the harbor facilities. This is a 29% increase from 1973 when 418 vessels used the harbor. Other boat launch sites are located north and south of the harbor entrance and traffic at these facilities is intensive.

2.21 Recreational summer cottages line large portions of the backshore bay area, although the extensive shore grass, marshlands, and shallow open waters provide suitable habitat for a variety of small game. During the winter months when this area is frozen, snowmobile use is heavy.

2.22 Fishing in the offshore harbor waters occurs year around, with yellow perch, sunfish, and catfish comprising the bulk of the summer catch. Winter ice fishing is intensive for northern pike and yellow perch, with pike spearing shanties dominating the nearshore waters. Bait and Russian hook fishermen groups are located randomly inside the islands. Sucker and carp spring spawning runs up the rivers and ditches provide excellent spear fishing.

2.23 Upland Plant and Animal Life. The Sebewaing River is located in Subarea 3.2 (Figure 5) of the Great Lakes Basin Framework Study (GLBFS). A general listing of wildlife for the subarea is compiled in Table 3. This harbor lies in the fall migration corridors for diving ducks (Aythyinea), dabbling ducks (Anatinae), Canadian geese (Branta canadensis), and blue and snow (Chen sp.) geese, and is within a primary waterfowl use area for nesting by wood ducks, mallards, and the blue-winged teal.

2.24 Thousands of pheasant and duck hunters are attracted to Huron County each fall. Countless ringnecks are bagged in the rich farmland county. At one time, pheasants were abundant, but clean farming practices have caused a decline in habitat quality, resulting in reduced populations. Duck hunters' blinds dot the Saginaw Bay Shoreline in the Sebewaing area indicating the popularity of this sport.

2.25 The forest cover in Huron County is eastern hardwoods with the elm-ash-cottonwood, maple-beech, and aspen-birch being the major forest types. At Sebewaing the major trees are elm (Ulmus spp.), willow (Salix spp.), and cottonwood (Populus deltoides) with a few maple (Acer spp.), oak (Quercus spp.), black walnut (Juglans nigra), and aspen (Populus tremuloides) as minor species.

2.26 Water Quality. The Michigan Water Resources Commission has designated the waters of Lake Huron and Saginaw Bay for total body contact recreation, protected for agricultural uses, navigation, industrial water supply at the point of intake, and warm water fish. The waters of Saginaw Bay meet the criteria required for these uses (MDNR, personal communication), though the inner bay area is nutrient enriched.

2.27 Water quality problems are related to organic wastes created by municipalities and industry. Erosion and sedimentation have also aggravated the water quality problem. Degraded water quality restricts the use of water for water supply, fishing, and body contact recreation and discourages development of the adjacent areas, especially for recreational purposes.

2.28 Turbidity, or water cloudiness, is a natural phenomenon and primarily the result of suspended particulate material. Much of this material is evolved from land and streambank and is most noticeable in the bay following periods of heavy rains. Fine sediments are also resuspended when wind generated waves interact with the bottom sediments, particularly during stormy weather.

2.29 Water quality in the river is adversely influenced by urbanization. Storm drains and non-point source surface runoff contribute nutrients and bacteria to the Sebewaing River. Sediments evolving from erosion also contribute to the degradation process. Industrial and municipal point source discharges also add contaminants which influence water quality.

2.30 Limited data on the quality of water in the Sebewaing River appear in the Region VII Water Quality Inventory (23). Average values of dissolved substances are reported from the vicinity of the river mouth in thousands of kilograms per day. Using the average river flow of 37.3 cubic feet per second, the following average concentrations are derived:

Chloride	85 mg/l
Total phosphorus	0.33 mg/l
Ammonia nitrogen	0.2 mg/l
Nitrate nitrogen	25.2 mg/l
Total coliform bacteria	1100 counts/100 ml

2.31 The nitrate and coliform counts are high relative to values within the normal uncontaminated ranges of river water quality. The Water Quality Inventory lists the lower Sebewaing River as a suspected coliform problem area, a designation similarly made for nearly every river discharging into Saginaw Bay. The excessive nitrate nitrogen levels are probably attributable to agricultural runoff. The shallow glacial cover would provide little sustaining base flow for the river, and much of the river volume would be comprised of direct runoff. Some amount of nitrate might be derived from industrial and municipal sources in Sebewaing such as the Michigan Sugar Company, Michigan Producer's Dairy Company, and the Village of Sebewaing storm water collection system. The Water Quality Inventory cites localized depression of dissolved oxygen levels in the Saginaw Bay near the mouth of the river following storms, and attributes the low dissolved oxygen to pollutant loadings from local industries and the Sebewaing River.

2.32 Ground water is practically unavailable from the glacial soils, as indicated in logs of domestic wells on record from within and near Sebewaing Village. The Michigan Department of Natural Resources similarly indicates that water in the glacial deposits is scanty. Domestic wells are seated in the bedrock at depths approaching 300 feet (Saginaw and Upper Marshall Formations). Although the Michigan Department of Natural Resources indicates the bedrock in the area is highly productive of water, which tends to be brackish, the domestic well records indicate that bedrock in the Sebewaing locality produces potable water adequate for domestic and small commercial demands, but probably not adequate to sustain flow of several hundred gallons per minute to a single well.

2.33 Public Water Supply. A mobile home park north of the Village provides ground water to its residents, but there is no municipal water supply in the area. The uniformly clayey nature of the glacial overburden, ranging in thickness from 50 to 100 feet, indicates the bedrock water supply is adequately protected from the surface and near-surface activities of man.

2.34 Wastewater. The Sebewaing wastewater treatment plant consists of stabilization ponds which are discharged semi-annually into Werschky Drain. The drain empties into Saginaw Bay 2 1/2 miles south of the Sebewaing River mouth. The treatment plant produces effluent of quality which remains within specific National Pollution Discharge Elimination System limits. Because the treatment plant effluent does not enter the Sebewaing River, it should have no significant impact upon the quality of water or sediments in the Sebewaing River Channel.

2.35 The Ridgeway Mobile Home Park, 1 1/2 miles north of the Village, is served with stabilization ponds which discharge into a drain on Kilmanagh Road. The drain empties into Saginaw Bay, 1 1/2 miles north of the river mouth.

2.36 The municipal wastewater treatment system serves 98% or more of the Village residences. There are one half dozen or fewer residential and commercial buildings not connected, and these discharge into seepage fields. The Village storm water collection system is separate from the sanitary sewer system and has 11 or 12 points of discharge into the Sebewaing River within the Village limits.

2.37 River Sediment Quality. The Environmental Protection Agency tested river and channel sediments in 1970, 1972, 1974 and 1975 (Appendix C and Figure 8). The upstream segment samples from Stations 1, 2 and 3 between river miles 1 and 1.5 are uncontaminated, except for the heavy metals, nickel and barium. Stations from the C & O Railroad bridge into the outer channel (Station 4-13) show sediment contaminated with most or all of the following:

TVS (total volatile solids)	Total phosphorus
COD (chemical oxygen demand)	Oil and Grease
TKN (total kjeldahl nitrogen)	

2.38 Sediments from Station 6 and 7 (river miles 1/4 to 1/2) show contamination with lead, manganese and copper. The station at river mile 0.0, number 12, shows contamination with barium, manganese, nickel, arsenic and chromium. Station 13, approximately one mile lakeward from Station 12, shows sediments contaminated with barium, nickel and cadmium.

2.39 The high concentrations of leaves and twigs and other plant remains in many of the samples contributes to the high levels of TVS, COD, TKN and total phosphorus. Specific sources of contaminating heavy metals are not obvious but are doubtless related to agriculture and industry.

2.40 Primary Productivity; Food Chain. The inner portions of Saginaw Bay, from Sand Point to Pt. Lookout, are shallow with an average depth of 15 feet and a maximum depth of 46 feet. Because Saginaw Bay is relatively shallow and has a high flushing rate, nutrients are constantly being introduced by industries, municipalities, and overland runoff. Levels of these nutrients are sufficient to cause nuisance algae blooms.

2.41 The waters closest to the Saginaw River rivermouth have the highest concentrations of nutrients; and these nutrients are used by the primary producers, the green plants, for growth and reproduction.

Tentative conclusions are that drastic reductions in phosphorus loadings are necessary before any significant decrease in plant growth will occur in the bay. Even if all point source discharges of phosphorus to the watershed are eliminated, phosphorus input from non-point sources may still cause nuisance plant growth.

2.42 Since the waters of the bay are turbid, the primary producers are mainly limited to emergent vegetation at the shoreline and phytoplankton (floating algae) in the open waters. This open water phytoplankton community is dominated by green and blue-green algae in the inner bay.

2.43 The massive nutrient input from the watershed to the bay feeds the production of the lake. Filter feeding organisms remove the phytoplankton from the water and use the algae as a food source. Decomposition of the dead plant material by bacteria also supplies a food source for numerous detritivours, or litter feeders. In turn, all these organisms provide a food source for the carnivores or predators of the aquatic system. These carnivores include the northern pike (Esox lucius), yellow perch (Perca flavescens), great blue heron (Ardea herodias) and ultimately man.

2.44 Fish. The warm, shallow waters and extensive cattail (Typha spp) and bulrush (Scirpus spp) marsh areas of Saginaw Bay provide a moderately diversified range of fishery habitat. The sports catch is dominated by yellow perch, members of the Centrarchid family including bass (Micropterus sp.), sunfish (Lepomis sp.), northern pike (Esox luscius), and catfish and bullheads (Ictalurus spp.).

2.45 For years, Saginaw Bay has been considered an abundant commercial and recreational fishing resource. Over 90 species have been recorded in the bay, including lake herring (Coregonus artedi), smelt (Osmerus spp.), chubs (Hybopsis spp.), white sucker (Catostomus commersoni), channel catfish (Ictalurus punctatus), yellow perch (Perca flaverseus), walleye (Stizostedion vitreum), whitefish (Coregonus clupeaformis), lake trout (Salvelinus namaycush), bullheads (Ictalurus spp.), rock bass (Ambloplites rupestris), carp (Cyrinus carpio), alewife (Alosa pseudoharengus), smallmouth bass (Micropterus dolomieui), northern pike (Esox lucius), rainbow trout (Salmo gairdneri), coho salmon (Oncorhynchus kisutch), and numerous forage and non-commercial fish.

2.46 In 1970 and 1971, the Michigan Department of Natural Resources (MDNR) conducted a biological survey of Saginaw Bay and made a determination of existing fish populations. This survey indicated that large numbers of yellow perch and moderate numbers of pumpkinseed sunfish (Lepomis macrochirus) inhabit the local waters. Table 4 contains the trawling data from three collection periods.

2.47 The November 1970 fish collection showed a decline in the perch and pumpkinseed populations. This is attributed to these species moving into the warmer, deeper waters of Saginaw Bay for winter. When the May survey was conducted, the main populations were apparently still in deep water.

2.48 Benthos. The benthic community is comprised of all organisms that burrow through the mud, attach themselves to solid surfaces, or crawl on the bottom. The density and species depend upon the bottom type (sand, gravel, silt), amount of organic food source, water depth, and degree of organic enrichment.

2.49 Benthic organisms are usually classified into three basic groups: tolerant, intolerant, and facultative. The tolerant organisms are those that can survive and thrive in enriched or polluted environments, whereas the intolerant organisms are environmentally sensitive and normally not found in polluted conditions. Facultative organisms survive in a wide variety of conditions. Analysis of these benthic macroinvertebrates has proven to be a valuable tool in evaluating the prevailing water quality.

2.50 In 1965, between May and September, 3 biological investigations of Saginaw Bay were conducted by the Federal Water Pollution Control Administration (FWPCA) as part of the Lake Huron Comprehensive water pollution studies. Sludgeworms (oligochaetes) are pollution tolerant and were found to be the predominant benthic organism in Saginaw Bay with the largest concentrations located on the north side of the bay. Scuds (amphipods) are intolerant or facultative and were predominant in the outer bay with the greatest concentrations being in deepest water. The University of Michigan conducted a benthic study in 1970 and found conditions similar to the results from 1965, although there was an increase in the oligochaetes population by as much as sixfold (3).

2.51 Threatened and Endangered Species (Fauna and Flora). No threatened or endangered species have been identified as existing within the project area, although the Federal Register, Vol. 41, No. 208, 27 October 1976, and updates indicate that the following threatened or endangered wildlife species could be found in the area. The Indiana Bat (Myotis sodalis), Eastern Timber Wolf (Canis lupus lycaon), American Peregrine Falcon (Falco peregrinus anatum), Kirtland's Warbler (Dendroica kirtlandii), and the Longjaw Cisco (Coregonus alpenae) are listed as endangered. Only two proposed threatened or endangered plants, as listed in the 16 June 1976 Federal Register, occur in Michigan. They are the Small Whorled Pogonia (Isotria medeoloides) and the Harts' Tongue Fern (Phyllitis scolopendrium var. americana). Neither species is known to inhabit the project

area. The Michigan Department of Natural Resources Endangered Species Citizens' Advisory Committee prepared an annotated list of endangered and threatened species. In addition to the wildlife listed in the Federal Register, the committee regards the Cisco or Lake Herring (Coregonus artedii) as threatened in Lake Huron. Critical habitat for these animal and plant species is not present in the project area.

2.52 Archeological and Historical Resources. The National Register of Historic Places (Fed. Reg., Vol. 41, No. 28, 10 February 1976) has been consulted and subsequent issues of the Federal Register checked. The National Register of Historic Places lists the Albert E. Sleeper House, the Grindstone City Historic District, the Frank Murphy Birthplace, the Point Aux Barques Lighthouse, the Stafford House, and the Indian Mission as being within Huron County. No districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, and culture maintained by the Secretary of the Interior are in the immediate project area, nor have any been identified as eligible for inclusion in the register.

2.53 The Michigan State Historic Preservation Officer has reviewed the proposed dredging and disposal operations at Sebewaing Harbor. An archeological survey has been conducted and is included as Appendix F. Correspondence is included in Appendix E.

2.54 The Michigan History Division prepared an inventory of over twelve hundred districts, sites, buildings, structures, and objects significant in Michigan (8). This inventory includes those sites listed in the Federal Register as well as properties listed in Michigan's State Register of Historic Sites. The Luckhard Museum in the City of Sebewaing has been identified as being significant to Michigan's social history but is not within the project area.

2.55 Specific Site Information. Each location is addressed and evaluated separately.

a. Federal Channels

2.56 Water Quality. A report (1) on water quality republished by the Michigan Department of Natural Resources in 1968, covering years 1965-1967, indicated that the water at the monitoring station near the mouth of the Sebewaing River (Figure 6, Appendix A) exhibited depressed dissolved oxygen (DO) and high biochemical oxygen demand (BOD) concentrations. This indicated organic loading in the river. The data are summarized in Appendix A. High total and fecal coliform densities were also recorded, which indicated contamination by warm-blooded animals. Another report of the Michigan DNR (2) pointed

out that, near the mouth of the river, depressed oxygen and high coliform and nutrient levels exist, indicating substandard water quality.

2.57 Data, covering the period of 1963 to 1975, for the monitoring station at the C&O Railroad Bridge are also included in Appendix A. Some depressed dissolved oxygen levels have occured that have not met the Michigan State Water Quality Guidelines (Appendix B). High total and fecal coliforms have also been recorded at this station.

2.58 In April 1974, EPA compiled and evaluated the existing information on Saginaw Bay and documented the present status (3). The report concluded that organic enrichment and dissolved oxygen depression result in poor water quality at the mouth of the Sebewaing River. High total and fecal coliform densities are found throughout the river. Nutrient concentrations increase downstream but are not excessively high. From August to September, chlorides are moderately high in the lower river. The Great Lakes Basin Framework Study (4) also indicated substandard water quality near the mouth of the Sebewaing River. This study reported that depressed dissolved oxygen and high coliform and nutrient levels existed at this location.

2.59 Sediment Quality. The sediments from the navigation channel in Sebewaing Harbor were sampled by the Region V, U.S. Environmental Protection Agency in 1970, 1972, 1974, and 1975. The data from these samplings are compiled in Appendix C, and the sampling stations are shown on Figure 8.

2.60 In 1970, the river channel was sampled from just below the confluence of the State and Columbia Drains to Buoy RN 10. The channel from Buoy RN 10, upstream 2,000 feet into the river was classified as polluted mud, ooze, and sand, and the remainder of the river as unpolluted sand, gravel, and ooze. From the 1972 sampling, EPA concluded that the sediments from Buoy RN 10, upstream 9,500' into the river were polluted ooze. Samples collected in 1974 showed the gravel and sand from the area above the C&O Railroad Bridge as meeting the EPA suggested criteria (Appendix C) for unpolluted sediments. The channel lakeward from the C&O Railroad contained sand, silt, and leaves twigs that exceeded the EPA guidelines for polluted sediment classification.

2.61 Based upon the 1975 survey results, EPA classified the channel from the C&O Railroad Bridge to approximately river mile 0.6 as moderately polluted; the channel from river mile 0.6 to river mile 0.0 as heavily polluted; and the channel lakeward of river mile 0.0 as unpolluted (see Figure 1). The channel from the C&O Railroad

Bridge to about mile 0.0 was found to contain leaves detritus, and fibers. Limbs, twigs, leaves, and other biological products accumulate during the ice jams and the material has a tendency to settle and decay, resulting in the high organic content in this river reach.

2.62 Benthos. In 1974, the benthic data reported by EPA for Sebewaing Harbor indicated a benthic community typical of a warm-water enriched habitat. The upstream portion of the navigation channel was comprised predominantly of midges, while the lower navigation channel was dominated by pollution tolerant oligochaetes (Limnodrilus spp. and Tubifex sp.). The downstream navigation channel receives non-contact cooling water from a metal stamping plant. Because dredging has not been accomplished since 1968 and the municipal wastewater lagoons have been in use only 4 years, the sediments will continue to be influenced by this accumulation of pollutants, and this may account for the dominance oligochaetes.

2.63 In areas of heavy organic enrichment, concentrations of oligochaetes as high as 400,000/m 2 have been reported. Maximum values from the navigation channel were under 500/m 2 (Appendix D). Although these values are not excessive, the almost total absence of other intolerant organisms indicates an unbalanced and stressed aquatic system, resulting from some environmental problem.

2.64 Collected benthic organisms reveal improved water quality in the outer navigation channel compared to the river channel. This is probably the result of a dilution of contaminants by the water of Saginaw Bay and the result of a stable, and thus more suitable, sediment for colonization. The outer channels were dominated by tolerant midges while the river channel dominants were very tolerant oligochaetes.

2.65 Sampling results from the 1975 EPA survey indicated a dominance of oligochaetes in the downstream portion of the navigation channel, although benthic densities were extremely low. Although volatile solids were moderately high, much of the material was of a fibrous or cellulose consistency, which is not in a form readily available to the oligochaetes. The biology data are compiled in Appendix D and the stations located in Figure 8.

2.66 Fish. The Sebewaing River itself is not generally considered a fishing area, although fish do transit the river during spawning activity. The Michigan DNR District Biologist has indicated runs up the river in March and April of pike and suckers, and carp runs in May following periods of warm rain. Some perch move into the river in early spring, following minnows, but most remain in the nearshore waters of Saginaw Bay in May and early June. There are no known fish spawning areas in the project channels.

2.67 Endangered or Threatened Species. No known endangered or threatened species listed on either the Federal or State list are known to inhabit the project area.

2.68 Historical Sites. One historical site is listed on the 1975 Michigan Historic Preservation Plan for the Village of Sebewaing. It is the Luckhard Museum and former church, home and school for missionary John J. Auch, who worked among the Chippewa Indians. The site will not be impacted by the proposed Corps operations.

2.69 Fish. Primary recreational use of the Federal navigation channels comes from the public boat launching facility located on the riverbank. This launching site provides access to Sebewaing and subsequently to Saginaw Bay for watersports enthusiasts. Minimal fishing is conducted in the navigation channel proper.

b. Disposal Sites: Non-Contaminated Dredged Material

2.70 The proposed disposal sites for the non-contaminated materials are located at the flood control dikes 7 to 14 feet above LWD for repair of breaches and at the open water disposal site 2 1/2 miles west of the outer channel bouy in 13 feet of water. (Figure 4 and 5)

2.71 The open water disposal site is located in moderately shallow water. Government divers have inspected the site, determined sediment compositions and verified the absence of historic artifacts. Recreation in the open water disposal area includes fishing and boating, as is true with the remainder of the Bay area.

c. Disposal Sites: Contaminated Dredged Material

2.72 The Corps of Engineers operates under Federal Regulation 33 CFR 209.145(b)(1) governing open water disposal of polluted sediments. The Governor of Michigan has also requested that polluted sediments be confined. No dredging will occur in those portions of the Federal channels classified as contaminated by the U.S. EPA until a suitable CDF is available for disposal of the dredged sediment.

2.73 The proposed site (Figure 5, Site A-1) is located on a section of Saginaw Bay shoreline approximately 1/4 mile south of the Sebewaing River. The site is the northern portion of the Sebewaing Airport property. The area is part of the long-term plan for Sebewaing Airport extension. The planned airport extension site consists of approximately 9 acres, of which approximately 2.3 acres were a low grade shallow fresh water marsh (Type 3 as defined by United States Fish and Wildlife Service, Circular 39). The soil of this wetland

area was generally waterlogged throughout the vegetative season and parts of the low areas were covered with 6 inches or more of water depending on the water levels of the lake. Cattails (Typha sp.) were the dominant form of vegetation in the wet patches. The total A-1 site appears to have been used for dredged material disposal in past years, contributing to its present wooded state. Approximately 6 acres of this site are wooded. The dominant genus, Populus, is represented by Large-toothed Aspen (Populus grandidentata) and Cottonwood (Populus deltoides). Black Locust (Robinia pseudo-acacia), Cherry (Prunus sp.), Willow (Salix sp.), and Red-Osier Dogwood (Cornus stolonifera) were also present. The emergency dredging disposal area covered a portion of the A-1 site including the wetland area (See paragraph 1.17).

2.74 Three other sites which could be used in conjunction with the proposed site, A-1, are A-3, A-4 and L, shown on Figure 5.

2.75 Site A-3: This 5-acre area is lowland herbaceous meadow in which grazing is simulated by repeated mowing. Remnant wetland plants including Threesquare (Scirpus torreyi), Nut-grass (Cyperus sp.), and sedge (Carex sp.) persist. Boneset (Eupatorium perfoliatum), Willow-herb (Epilobium sp.), Silverweed (Potentilla anserina), Plaintain (Plantago sp.), Skullcap (Scutellaria sp), and various grasses (Graminae spp.) characterize the vegetation. Unfilled areas of Site A3 have 0-10 inches of fine sand over coarse sand (10-18 inches) and sand and gravel (18 or more inches) with the water table between 10 and 15 inches. Filled areas have mixtures of marl, clay, silt, sand, and gravel with the water table between 18 and 26 inches.

2.76 Site A-4: This 9-acre area is primarily lowland herbaceous meadow surrounding remnant wetland vegetation. An abnormally dry year has further reduced the wetland and surface water is absent over 90 percent of this shallow marsh. Repeated mowing and brush removal (Red-Osier Dogwood) over the entire area of Site A4 has produced a lowland herbaceous meadow vegetation covering 7.5 acres of the site. The remaining wetland plants from this formerly diverse wetland include:

- Threesquare (Scirpus torreyi)
- Softstem Bullrush (Scirpus validus)
- Rush (Juncus sp.)
- Nut-grass (Cyperus sp.)
- Spike-rush (Eleocharus sp.)
- Narrow-leaf and Common Cat tail (Typha angustifolia & T. latifolia)
- Arrow-grass (Triglochin sp.)
- Arrowhead (Sagittaria sp.)
- Water-plantain (Alisma sp.)
- Blue flag (Iris versicolor)
- Smartweed (Polygonum sp.)

2.77 Unfilled areas of Site A-4 have 0-10 inches of fine sand over coarse sand and gravel with the water table between 0 and 9 inches. Filled areas consist of a mixture of sand, silt, clay, marl, and gravel with the water table between 10 and 18 inches.

2.78 Site L (Lagoon): This is a 15 acre site situated on land which is a part of the Sebewaing Waste Water Treatment lagoon property. It is beyond primary pumping distance from dredging operations and would require an interim holding area near the project area. Site L is an open meadow covered seasonally with indigenous vegetation consisting of open field grasses and forbs.

d. Flood Control

2.79 The flood control dikes in the project area are about fifteen feet wide and four to seven feet high. Existing vegetation includes grasses, sumac and poplar trees. Wildlife consists of rodents, songbirds, and occasionally pheasants, gulls, and terns.

e. Structures

2.80 The flood control structures consist of earthen dikes in the flood control project area upstream from the C&O Railroad Bridge. Portions of the riverbank have been revetted with steel sheet piling and concrete for erosion protection (Fig. 2). The 5 stop log structures located immediately upstream from the C&O Railroad Bridge provide access to the river for commercial businesses. The structures are concrete openings in the dike that have grooves on each dike end to allow the emplacement of 3 inch timber planks when flooding threatens. Once the timbers swell, the structures are essentially water tight and provide the same protection as the dike. These dikes provide no recreational value and are strictly for flood control. They do provide ground cover and tree habitat for some chipmunks, fox, squirrels and songbirds.

2.81 The rivermouth structures that act as breakwaters are constructed of previous river dredgings that were deposited adjacent to the river channel. Both breakwaters are finger like structures, essentially separated from the mainland by dredged channels. They provide minimal recreational value and marginal habital for terrestrial life typical of an abandoned farm community. The south breakwater was largely destroyed by high water and storms in 1972.

Table 3

Status of Wildlife as of 1970 (4)
Great Lakes Basin Commission Planning Subarea 3.2

Class and Species	Scientific Name	Density	Trend	Notes
BIG GAME				
White-tailed Deer	Odocoileus virginianus	Medium	Stable	
Black Bear	Ursus americanus	Low	Decreasing	*
Turkey	Meleagris gallopavo	Low	Stable	*
WATERFOWL				
Ducks	Anatinae; Aythyinae; Merginae	High	Stable	
Geese	Anserinae	High	Stable	
SMALL GAME				
Cottontail Rabbit	Sylvilagus flordanus	Low	Stable	
Ring-necked Pheasant	Phasianus colchicus	Medium	Stable	
Ruffed Grouse	Bonasa umbellus	Medium	Stable	
Gray Squirrel	Sciurus carolinensis	Low	Stable	
Fox Squirrel	Sciurus niger	Medium	Stable	
Woodcock	Philohela minor	Medium	Increasing	
Mourning Dove	Zenaidura macroura carolinesis	High	Stable	
Snowshoe Hare	Lepus americanus	Low	Stable	*
Bobwhite Quail	Colinus virginianus	----	----	*
FURBEARERS				
Muskrat	Ondatra zibethica	High	Stable	
Mink	Mustela vison	High	Stable	

Table 3 (Cont.)

Status of Wildlife as of 1970 (4)
Great Lakes Basin Commission Planning Subarea 3.2

Class and Species	Scientific Name	Density	Trend	Notes
FURBEARERS (Cont.)				
Beaver	Castor canadensis	Medium	Stable	*
Weasel	Mustela spp.	Medium	Stable	
Raccoon	Procyon lotor	High	Stable	
Skunk	Mephitis mephitis	Medium	Stable	
Opossum	Didelphis marsupialis	Medium	Stable	
Badger	Taxidea taxus	Low	Stable	*
Otter	Lutra spp.	Low	Stable	*
NON-GAME				
Woodchuck	Marmota monax	Medium	Stable	
Red Fox	Vulpes fulva	High	Stable	
Gray Fox	Urdcyon cinereoargenteus			*
Crow	Corvus spp.	Medium	Stable	
Red Squirrel	Tamiasciurus hudsonicus	Medium	Stable	
Coyote	Canis latrans	Low	Stable	*
Raptors	Strigiformes; Buteos	Medium	Stable	*
Porcupine	Erethizon dorsatum	Low	Stable	*
Bobcat	Lynx rufus	Low	Stable	*

Table 3 (Cont.)

Status of Wildlife as of 1970 (4)
Great Lakes Basin Commission Planning Subarea 3.2

Class and Species	Scientific Name	Density	Trend	Notes
ENDANGERED (E) STATUS UNDETERMINED(S)[1]				
Bald Eagle (E)[2]	Haliaeetus leucocephalus	Low	Stable	*
American Osprey (S)	Pandion haliaetus	Low	Decreasing	
Kirtlands Warbler (E)	Dendroica kirtlandii	Low	Decreasing	*
Eastern Pigeon Hawk (S)	Falco columbarius	-	-	*
UNUSUAL OR UNIQUE ANIMALS[3]				
Sandhill Crane	Grus canadensis	Low	Stable	*
Golden Eagle	Aquila chrysaetos	-	-	*

[1] Rare and Endangered Fish and Wildlife of the United States, U.S. Bureau of Sport Fisheries and Wildlife, 1968 Edition. Also based on February 1972 data from the Bureau's Office of Endangered Species.

[2] For the purpose of this listing the northern and southern subspecies of bald eagle are listed as bald eagle, the endangered status being the important consideration.

[3] Animal species considered to be unusual or unique on a regional, State, or planning subarea basis.

*Not common to immediate project area.

Table 4
Michigan DNR Sebewaing Bay Fish Trawling Data

Species	Scientific Name	September 1970	November 1970	May 1971
Yellow Perch	Perca flavescens	1,306	794	131
Pumpkinseed	Lepomis gibbosus	652	34	12
Calico bass	Pomoxis spp.	90	47	3
Bullhead	Ictalurus spp.	27	10	1
Golden Shiner	Notropis crysoleucas	20	99	3
Common Shiner	Notropis cornutus	38	8	5
Alewife	Alosa pseudoharengus	75	1	—
Carp	Cyprinus carpio	3	2	1
Largemouth bass	Micropterus salmoides	1	4	-
Johnny darter	Etheostoma nigrum	25	-	-
Catfish	Ictalurus punctatus	1	-	-

3. RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

3.01 The only land use plan which applies to the project area is the Huron County, Michigan, "General Development Plan", dated June 1973, sponsored by the Huron County Planning Commission, Harbor Beach, Michigan. This plan has been reviewed and the proposed activities are not in conflict with it.

4. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.01 General. Federal projects in Sebewaing Harbor consist of construction, operation and maintenance of a shallow-draft navigation channel, flood control structures and channel, construction of a confined disposal facility for contaminated dredge materials, and dynamiting ice jams for the prevention of floods. The Sebewaing Harbor area contains numerous publicly and privately constructed facilities including berthing areas, canals, small marine slips, boat launching areas, and docks. Without such facilities, the Federal dredging project could not be used effectively. The flood control structures and channel reduce the frequency and intensity of local floods and protect the lower lying portions of the community from occasional inundation and economic loss which results in increased social stability in the area.

4.02 The maintenance dredging, structure repair and flood control operations affect the flood and high water problems in Sebewaing. Maintenance of the flood control structures also minimizes streambank erosion in the Federal project area.

4.03 In addition to providing access for recreational craft, maintenance dredging provides a deepened rivermouth channel that allows the discharge of broken and cracked ice into the deeper waters of Saginaw Bay. This helps alleviate backed-up high waters in the upstream reaches of the project. Maintenance of the earthen dikes, steel sheet piling revetments, and dredging of the flood control project to maintain authorized dimensions provide an increased discharge channel capacity and reduced flood potential for nearby residential areas. The stoplog structures that provide entranceways to the river are essentially watertight when the timber planks are emplaced, thus providing continuity in the dikes. The concrete and steel riverbank revetments and grassed dikes provide erosion protection for the riverbank in the project area.

4.04 The effects of construction and operation of a diked disposal facility for containment of contaminated dredged materials will be described in connection with specific areas as identified.

Harbor Construction, Operation and Maintenance

4.05 Operation and maintenance of Sebewaing Harbor will have minimal effect on Huron County population growth. Maintenance dredging will not affect county residential structures adjacent to the harbor, and no persons will be displaced or require relocation. The flood control structures and ice jam clearing operations have a major effect on residential structures. Without these flood control measures, a large portion of the residential housing at Sebewaing would be underwater during spring thaw and runoff.

4.06 Much of the land along the Sebewaing River is residentially and commercially developed, although large tracts of undeveloped land are available for future development on the outskirts of the villages. Thus, continued project activities may have a long-term beneficial effect of medium magnitude on Huron County population parameters by assuring present residents of continued housing and helping to attract new residents to the community. The project will have no direct or indirect short or long-term adverse effects on community cohesion such as private club and civic group participation.

4.07 Dredging of the harbor basin and Federal navigation channel to authorized depths, when necessary, will allow continual safe movement of recreational craft. Supporting businesses depend, in part, on the commerce generated by the recreationalists using the harbor area. In turn, this will have a minor, indirect, long-term beneficial effect upon revenue, employment, and earnings of Huron County residents. Businesses are not expected to experience sales losses caused by temporary inconveniences that may be encountered during operations and maintenance activities. The project will have a direct impact on the continued use of the harbor for recreational boating by local and regional residents, as well as tourists.

4.08 Water Quality. Several temporary and permanent effects on water quality can be expected to result from operation and maintenance of the project. Temporary effects include increased turbidity from dredging and structural repairs, possible resuspension of contaminants in the sediments, potential spillage of oils or dredged materials during maintenance operations, and litter problems caused by the recreational boaters and fishermen using the waterway. The removal and confinement of polluted sediments may improve water quality if further reductions in contaminant inputs occur.

4.09 Environmental impacts may result from harbor survey and inspection, dredging operations, after dredging survey operations, transport of dredged material, disposal of dredged material, structural repair of the breakwater and structures, and dynamiting the ice jams.

4.10 Construction of a diked disposal facility could provide protection for shore areas, reducing erosion and runoff from lowlands.

a. Turbidity

4.11 Turbidity in the channel and bay area is a natural phenomenon. Winds stir the waves during stormy weather and rains carry sediments lakeward from tributaries. Turbidity caused by dredging is related

to the amount of work done, weather conditions, and sediment composition. Turbidity will result from the planned dredging and disposal operations. During dredging, temporarily high turbidity will characterize the immediate vicinity of the dredge and open water disposal areas. Depending on current velocities, these highly localized turbidities will affect an area which could extend several hundred yards or more from the source.

4.12 Department of Interior (Federal Water Pollution Control Administration - FWPCA) studies conducted on hopper dredging in the Rouge River, Michigan, in 1967 reported that average suspended solids concentrations at the dredge, 1/4 mile and 1/2 mile downstream from the dredge were 9Xs, 2.5Xs and 1.6X times ambient upstream concentrations respectively. Suspended solids concentrations varied with sediment composition (16). At further distances, reduced concentrations are expected. Although the dredging in the river channels will be accomplished with hydraulic pipeline or bucket dredges, the resuspension and settling of sediments should be similar to hopper dredge operations.

4.13 Methods of controlling the turbidity of disturbed bottom sediments through dredging action are being investigated, though no practical solutions have been obtained for dredge operations. A more extensive study is also underway through the Dredged Material Research Program being supervised by the Corps Waterways Experiment Station (WES), Vicksburg, Mississippi. One of the tasks of this multifaceted program is the investigation of the problem of turbidity and the development of a predictive capability as well as physical and chemical control methods for employment in both dredging and disposal operations. Solutions to these investigations have not been finalized as of this date.

4.14 Though the sediments contain silt, the levels of turbidity in the area of operation are expected to return to near normal levels within hours following the completion of dredging operations. Maintenance activities for the Federal navigation structures may cause low to medium magnitude, short-term increases in turbidity levels in small portions of the harbor area waters.

b. Pollutants

4.15 Chemical water quality in the project area is not expected to be adversely affected by the proposed dredging or structure repair operations. There should not occur any significant degradation of water quality because of resuspension of heavy metals, organohalogens, organosilicones, pesticides, or other major constituents. An extensive research program is being carried out by the Corps of

Engineers Waterways Experiment Station (WES) to determine the effects of dredging and disposal operations in the Nation's waters. One phase of the studies involves the release of contaminants to the waters during disposal operations. An extensive study done by the University of Southern California for the Corps, entitled The Effects of Dispersion, Settling, and Resedimentation on the Migration of Chemical Constituents During Open-Water Disposal of Dredged Material D-76-1, concluded that no significant concentrations of toxic materials are released into solution during open water disposal of dredged material. No significant impacts on water supply are anticipated since the closest public surface water intake is over 15 miles distance from the dredging site. No deleterious effects on ground water are anticipated with this maintenance dredging. River reaches of the navigation project have been classified as polluted or unpolluted by the U.S. EPA. WES research has demonstrated that some organic materials, primarily nitrogen, are resuspended during dredging or open water disposal operations. Sediments dredged from those areas classified as uncontaminated should have little effect on water quality. Sediments dredged from the polluted portions of the navigation channel may resuspend nutrients. Overall dredging effects on water quality should be minimal.

4.16 As with any operation, the potential always exists for the unintentional spillage of pollutants. Oils and fuel used for operation of the dredges and other watercraft using the harbor may accidentally be discharged to the waters. The spillage of dredged material during the transfer from barges to the disposal site or breakage from the pipeline could occur. All precautions and normal maintenance will be carried out to prevent and minimize such spillage.

4.17 The State of Michigan Water Quality Standards are listed in Appendix B, and expected impacts of the alternatives are listed in Table 5.

c. Dissolved Oxygen

4.18 Contaminants in sediments normally are in equilibrium with the overlying waters. During dredging operations, disturbance of the sediments results in the resuspension of material. The resuspended anaerobic materials and organics tend to reduce the oxygen levels from 16 to 83 percent, due to high initial oxygen demand (8). Once dredging operations cease and the suspended particles resettle, oxygen levels return to ambient conditions.

d. Future Development

4.19 There does exist a possibility of long-term future adverse effects on water quality. As populations increase and if people

PARAMETER	MICHIGAN STANDARD*	NO DREDGING	DREDGING		DISPOSAL	OPEN WATER	
			POLLUTED	NON-POLLUTED	POLLUTED: CONFINED	NON-POLLUTED	DYNAMITING
Chloride	50**	Meets Stds	Meets Stds	Meets Stds	Meets Stds	Meets Stds	Meets Stds
Dissolved Oxygen	6	" "	***	" "	" "	" "	" "
pH	6.7 to 8.8	" "	Meets Stds	" "	" "	" "	" "
Temperature	+ 3F° outside mixing zone	" "	" "	" "	" "	" "	" "

Note: Rule 1092, State of Michigan, Water Quality Standards, states: "Water quality standards shall not apply to dredging or construction activities by the U. S. Army Corps of Engineers or this Department". The Corps will implement all practical steps to meet the State standards.

* All values except pH, mg/l

**Monthly aver age

***During dredging operations of heavily polluted material, the D.O. levels may drop below the allowable State limit as referenced in Paragraphs 4.13, 4.16. This is a temporary condition and oxygen levels will return to ambient levels shortly after dredging in the polluted portions of the navigation channel ceases.

TABLE 5: STATE OF MICHIGAN WATER QUALITY STANDARDS

desire to be near recreational areas, there will be a corresponding increase in municipal wastes requiring some manner of disposal. In similar fashion, industries that are presently located in the area that decide to expand operations, or, any new industries or supporting businesses that are attracted to the harbor area, are potentially capable of discharging contaminants to the surface waters of the area. This potential impact is expected to be mitigated because all industries discharging wastes must meet Water Quality Compliance Standards established by the State of Michigan Water Resources Commission.

4.20 The short-term water quality impacts from the proposed Corps operations include increased turbidity, resuspension of some contaminants and the potential spillage of oil and dredged material. Long-term water quality impacts are not considered significant.

4.21 Air Quality. This section discusses the effects of the proposed Corps operations on air quality and noise pollution.

a. General

4.22 All primary and secondary air quality standards were met during the latest (1975) monitoring program in Huron County. This was a substantial improvement over the eight recorded primary standard violations of 1974. This improvement is attributed to the air pollution control program of the Hercules Company at Harbor Beach.

4.23 Huron County was monitored by the Michigan DNR, Air Pollution Control Division in 1972, 1973, 1974 and 1975. Continuous monitoring conducted for ambient levels of sulfur dioxide (SO_2) revealed violation of the primary and secondary National Ambient Air Quality Standards up through 1974. Primary Standards call for a maximum 24-hour concentration of 365 micrograms/cubic meter (.14 ppm), and a monitoring station in Huron County reported values of 930 micrograms/cubic meter (.35 ppm). Secondary Standards indicate a maximum 3-hour concentration of 1,300 micrograms/cubic meter (.5 ppm), and the monitoring station contained 2,080 micrograms/cubic meter (.79 ppm). These excess SO_2 concentrations result from the Hercules Powder facility operations based at Harbor Beach (10). Air quality compliance was reached in 1975 at this industry.

b. Air Contaminants

4.24 Survey launches and tugs are powered by inboard, outboard, or inboard-outboard motors and can, therefore, be expected to release a very minor amount of oil and lead into harbor waters and gaseous pollutants, especially hydrocarbons and carbon monoxide, into the atmosphere of the project area, producing temporary, low magnitude adverse impacts on the area. These impacts are partially

controlled by the fact that all Corps and contract vessels are in compliance with USEPA standards for the control of smoke and fume emissions. Air pollution effects will probably be limited to those associated with automobile and vessel exhausts, and the anticipated increase in these sources should not be sufficient to cause any problems in this relatively remote area. The exhaust from the dredge during maintenance will have a minor effect comparable in extent to that of several diesel trucks. This will contribute to the volume of exhaust materials affecting air quality in the project area, but the total effect is expected to be negligible.

4.25 Structural repairs of the Federal structures will result in the emission of a minor amount of dust, odors, and gaseous pollutants to the atmosphere in the immediate vicinity of the structures under repair, resulting in a temporary, low-magnitude deterioration of the quality of the natural environment. The Corps of Engineers will control these effects as much as possible through precautionary measures. Dust control will be accomplished if necessary, and all maintenance vessels are in compliance with USEPA standards for the control of smoke fumes.

4.26 Organic material decomposition odors and hydrogen sulfide releases associated with some dredging projects are not expected to occur during dredging and disposal operations for this project.

c. Noise

4.27 A certain amount of noise is expected from operation of motors, pistons, winches, and the raising and lowering of the dredge bucket. Little of the noise associated with the dredging operations or the structural repair is audible beyond a 100-yard distance. This type of noise source rarely produces noise levels above the acceptable level of 80 decibels. Sound levels from equipment can be expected to range from 75-90 decibels for 50 feet, 64-84 decibels for 100 feet, 58-83 decibels for 200 feet, 50-75 decibels for 500 feet, and 44-69 decibels for 1000 feet(9). The maintenance and repair work will be conducted during normal working hours. Except for a few homes and cottages in the downstream channel areas, most residential structures are at least 100 feet from the edge of the navigation channel.

4.28 Wildlife and Habitat. All dredging operations will occur in the aquatic environment. The only impact of the proposed dredging activity on terrestrial wildlife is a temporary, low magnitude disruption of the waterfowl, songbirds, and shorebirds that use the disposal breakwaters, beaches, and harbor waters for resting and feeding. These species may be driven away from the immediate area by maintenance activities and noises. However, the additional

vessel activity will probably not add greatly to any disruption being caused by existing vessel traffic. Maintenance of the structures will cause short-term disruptions to established wildlife in the work area. Disruptions to wildlife are temporary in nature and wildlife will return to the area shortly after the noise from the structural repair operations ceases.

4.29 Use of any uncontaminated sediments for flood control dike repairs or upgrading would cover those portions of sediments that will displace any terrestrial wildlife presently at these sites. Open water disposal of this uncontaminated material will not impact any terrestrial wildlife. Dynamiting ice jams will not impact terrestrial wildlife. Maintenance operations will cause short-term disturbances of terrestrial wildlife. Some marginal terrestrial habitat will be altered from the disposal operations. Recolonization will occur in subsequent years.

4.30 Fisheries Resources. Effects of the proposed Corps operations on fisheries resources is covered in this section.

a. Primary Production

4.31 The effects of the Corps operations on the primary producers, the green plants that turn sunlight, carbon dioxide, and nutrients into cellular material, release oxygen as a by-product, will be minimal.

4.32 The navigation channel sediments do not contain attached macrophytic vegetation. Therefore, dredging operations will not impact submerged vegetation in the channels. However, during dredging operations, some nutrients in the dredged sediments are reintroduced into solution or suspension from anaerobic sediments (17). Some of these additional nutrients are available for aquatic plant growth until oxidation of the reduced nutrient forms occurs, resulting in the nutrients settling to the lake bottom, or the nutrients are incorporated in aquatic plant matter.

4.33 Disposal of the uncontaminated silts and sands removed from the navigation channels may bury or smother any vegetation located at the disposal site. Divers have inspected the open water disposal site for general bottom characteristics and historical artifacts. If any attached aquatic plants or algae are located at the disposal site, the deposition of soft, uncontaminated sediments to the open water disposal site should provide a suitable substrate for plant recolonization.

4.34 No submerged aquatic plants are expected at the open water disposal sites since turbidity levels in Saginaw Bay are high and apparently limit the colonization of submerged, attached macrophytic plants in the inner bay (MDNR personal communication). Turbidity may temporarily reduce phytoplankton populations. Oxygen released by the aquatic plants is not generally available for terrestrial use since oxygen saturation levels in the waters are generally less than 100 percent. During sunny days in the protected backwater areas, supersaturation may occur, though at night, oxygen depletions can occur in these same areas.

4.35 Maintenance of the Federal structures may occur on land and, therefore, would not impact aquatic vegetation. Disposal of the unpolluted material on the terrestrial land will smother some of the existing vegetation. Recolonization of dredged material by plants occurs within a year. Dynamiting the ice jams in the spring will not impact emergent vegetation since the work is done prior to the growth of any vegetation in the river.

4.36 Dredging, disposal, and structural maintenance operations may affect the fishery resources of the bay area. High turbidities have the effect of inhibiting phytoplankton productivity by decreasing sunlight penetration and, consequently, photosynthetic activity. The net loss to the aquatic food chain as a result of reduced photosynthesis in a limited area during construction and subsequent maintenance will represent a minor fraction of the total food productivity of the area's aquatic system.

b. Benthos

4.37 The dredging and disposal operations will have an adverse effect on benthic organisms which form a significant part of the aquatic food chain supporting the fishery resources. Disposal of dredged materials into the open water disposal site will smother some benthic organisms. Temporary turbid conditions will occur at the site when the dredge discharges its load. Suspended solids reduce light penetration and, if a sufficient light loss occurs, the life cycle of certain organisms could be adversely affected during that time; however, this is very unlikely because of the short exposure period.

4.38 Yellow perch, a major recreational sport fish in the area, feed heavily on minnows and the midge, Chironomus spp. (7) The bottom area disrupted by the disposal operations is insignificant when compared to the total bottom area available for feeding by these fish. Recolonization of these sites will occur once dredging and disposal operations cease.

4.39 The dredging operations will be removing the sparsely populated benthos sediment capable of providing habitat for aquatic fauna and flora. Removal of the existing bottom habitats for fish and benthic marcoinvertebrate communities will also result from dredging. Benthic communities can be expected to be subjected smothering from sedimentation which accumulates. Recolonization of these areas would generally be dependent on the species' nature, mobility of organisms inhabiting the affected areas and the subsequent type of substrate (22).

4.40 Lee & Plumb (18) postulated that burrowing organisms (Tubificidae and Chironomidae) would be favored during periods of increased sedimentation. Preliminary data from a study on "Determination of Verticle Migration of Benthos in Dredged Material Deposits" for the Corps Waterways Experiment Station indicate that juvenile hard clams and polychaete worms can migrate through at least 32 cm of sediments without apparent harm. Similar work is being conducted using certain fresh water invertebrates from the midge, mollusk, sludgeworm and mayfly groups. The final report is scheduled for distribution in 1978 by WES. Data indicate all freshwater individuals tested could migrate through 32 cm of sediments without apparent harm except the mayfly (11 cm). The effects of sedimentation on benthos in areas adjacent to the navigation channel and disposal site should be negligible since the channel sediments contain tolerant midges and oligochaetes and the disposal site is colonized by minor numbers of the same tolerant individuals.

4.41 Recolonization can occur quickly at both the dredged areas and the disposal sites. After termination of the Corps operations, it is expected that the surviving organisms will begin recolonization. Although benthic organisms will recolonize, the species diversity could be reduced. Because of the dredging and disposal, the species composition may never reach a true balance, and maximum sustained population density may never be achieved. Changes in the benthic community due to Corps operations are difficult to evaluate since the areas of operation support few taxa.

c. Sediment Quality

4.42 Maintenance dredging will have a minimal impact on the sediment quality in the project area. Removal of the uncontaminated sediments will not change the sediment quality. Removal of the contaminated sediments from the harbor channel and deposition into diked disposal sites yet to be constructed will reduce the possibility of these contaminated sediments being discharged into Saginaw Bay during periods of increased flow and discharge velocity in the Sebewaing River.

d. Water Quality

4.43 Short-term impacts on water quality are expected to occur during the proposed Corps operations. Increases in total solids, chemical (COD) and biochemical (BOD) oxygen demand, total phosphorus, some metals and possibly grease and oils would be expected to occur in the project area. Once operations cease, levels are expected to return to normal within a short time period.

4.44 Of greatest importance is the total solids parameter. Larval fish may not be able to migrate from the operational areas. If sufficiently severe, turbidities can cause the death of larval fish resulting from the coating of gill tissues with sediment particles and asphyxiation of affected animals. The distribution of larval fish in the bay area is not presently known, though a negative impact of dredging is the possible entrainment of fish fry. Spawning of the major fish species in the area occurs from the time of ice break-up into mid-summer.

e. Circulation

4.45 Maintenance operations will have a minimal effect on overall circulation patterns in the bay. Maintenance of the channels and structures will allow for increased river discharges during periods of high river flow, though during the remainder of the year, circulation pattern impacts are insignificant.

f. Migration

4.46 Dredging activities are coordinated annually with the Michigan Department of Natural Resources, the EPA, and the U.S. Fish and Wildlife Service. Dredging is scheduled to minimize impacts on fish spawning and migration, and on recreational boating, and is carried out with the approval of these agencies.

4.47 Recreation. The proposed activities affects are indicated in this discussion.

a. Disposal Area Usage

4.48 Continuation of maintenance operations in Sebewaing Harbor will have an overall beneficial effect on recreation in the bay area. The breakwater and bulkheaded, diked riverbank provide minor recreational fishing areas. However, maintenance operations create minor amounts of turbidity that may be aesthetically displeasing and require fishermen using the diked riverbank, disposal breakwaters and the open water disposal sites to relocate during structural repair and dredging operations.

b. Vessel Traffic

4.49 Maintenance of the channel will allow for the free access of pleasure craft into and out of the harbor. Recreational vessel traffic in the harbor is heavy during the summer months. In the fall, numerous duck hunters use the waterway as an entrance channel to Saginaw Bay. Although dredging operations may disrupt boater traffic, channel access is never totally blocked. A temporary adverse aesthetic impact of low magnitude will result from the presence of maintenance equipment in the harbor waters when viewed by persons wishing to observe this setting from bridge approaches and the shoreline adjacent to the harbor. Operation of the dredge may be aesthetically displeasing to some residents. As far as possible, dredging would be restricted to periods of time before 1 July and after Labor Day to avoid recreational boating.

c. Fish Available for Man's Use

4.50 Six commercial fisheries groups are licensed by the State of Michigan to operate from Sebewaing Harbor. Maintenance dredging will allow the fishing vessels unhampered access to the river channel for unloading operations, and this will be a beneficial effect. Dredging and disposal operations and repair of the Federal structures will have minimal adverse impact on commercial fisheries operations relating to local revenue, employment, or earnings within this industry.

4.51 Recreational fishermen will have access to the open waters of Saginaw Bay through the harbor if maintenance operations continue. Dredging of the Federal channels to authorized depth would possibly improve the recreation bank fishing that is popular with local riverside residents.

d. Wildlife Available for Man's Use

4.52 No significant impacts are expected on wildlife available for man's use by implementation of the Corps continued maintenance operations. These operations may impact some small rodents and songbirds, but small game located on the breakwaters and waterfowl immediately offshore will not be significantly impacted by the viewing public or hunters.

4.53 Public Utilities. The Village of Sebewaing, surrounding communities, and private residences obtain their potable water from deep wells. The closest surface public water intake is located over 15 miles distant. No adverse impacts on either surface or subsurface public and private water supplies are expected.

4.54 Cultural Resources. Effects upon the cultural resources are addressed.

a. General

4.55 Components of the existing human environment which are not expected to be directly affected by continued operation and maintenance of the Sebewaing River are demographic and cultural resources. However, these components will be indirectly affected to a moderate degree on a long-term basis. The project will have a beneficial short-term effect on local housing parameters by providing flood protection for residential housing so owner property values do not deteriorate and owners can repair and maintain households without fear of massive economic losses. This project, and future operation and flood control maintenance projects in the harbor, will have a long-term beneficial effect of moderate magnitude upon these parameters by preserving the desirability of the harbor as a recreational harbor, thereby promoting tourist business growth with the resultant taxes and increases in property values. Since there is waterfront property available for new construction, the project will have a beneficial effect upon new residential and industrial expansion and construction within the project area. The project will not destroy land areas, but it is likely that it will retain the present occupancies.

b. Archaeological and Historical

4.56 According to the archeological survey for the project (Appendix F), there are three archeological sites within one mile of the proposed disposal areas A-1, A-3 and A-4. A Native American village site is situated in the SW 1/4 of Section 8 of Sebewaing Township containing chipped points of chert, potsherds, and burned and cracked pebbles. A Native American village is located in the NW 1/4 of Section 18. A Native American cemetery is located in the center of Section 7. Disposal area A-1 lies in the NW 1/4 of Section 7. Sites A-3 and A-4 lie in the S 1/2 of Section 7. According to the State Historic Preservation Officer there would be no adverse effects from use of these disposal sites. Site L is in the N ½ of Section 19. There is high potential for the presence of archeological sites on the sand ridge remnant of post-glacial Lake Algoma which runs across disposal area L. A field survey is now being carried out on all four disposal sites. Evaluation of the results from site L and coordination with the Historic Preservation Officer is necessary before it can be used. The open water disposal site has been inspected by government divers; no historic artifacts have been found.

4.57 Caution will be exercised to guard against destruction of cultural resources either from excavation of soil on disposal area A-1 or deposition of excavated soil in disposal areas A-3, A-4, or L by

heavy earth moving equipment. Should construction personnel discover objects of possible archeological significance, operations would cease and consultation would occur with the Historic Preservation Officer of State of Michigan to evaluate the find and to supervise salvage operations if authorized.

c. Threatened or Endangered Species

4.58 Threatened or endangered species that may reside in the project area are listed and discussed in Section 2 and listed in Table 3. Mammals, birds, fish, plants, and other wildlife that are listed in the Federal or State guidelines as endangered or threatened, and may reside in the project area, are not expected to be impacted by the maintenance operations and structural repair.

d. Disease Vectors

4.59 Maintenance operations are conducted in the water. The area contains extensive marshy shorelines and shallow wetlands. Corps operations and maintenance are not expected to significantly impact the potential for arthropod (insect carried) or mollusc (intermediate host) vector diseases such as malaria, St. Louis encephalitis, or schistosome dermatitis (swimmer's itch).

4.60 The proposed confined disposal facility (Site A-1) at Sebewaing would be located on existing wetland and upland between the Sebewaing Airport and the Sebewaing River channel. The disposal area would have an east-west width between dike crest centers of 300 feet, and north-south length of 1,400 feet with its long axis on the extension of the north-south runway (Figure 5). The confined disposal area would be contained by dikes extending 5.5 feet above mean low water, with a dike core composed of silty clay to be obtained by excavation from within the confinement area. The external face of the west dike would be covered with heavy stone riprap. The north face of the dike, against which mooring and unloading would take place, would be sheet piled. Mooring piles would be placed here, 150 feet apart, for mooring and protection of the dike structure.

4.61 Uncontaminated sediments would be excavated from within the confinement site to provide the space required for disposal of 84,000 cubic yards of contaminated sediments. The uncontaminated sediments would be disposed by filling Sites A-3 and A-4 and the remainder would be trucked to Site L.

Construction and Operation of the Confined Disposal Facility

4.62 The following narrative discusses the probable impacts of the construction and operation of the confined disposal facility on the environment.

4.63 Vegetation. Changes to vegetation are expected to occur as a result of drier soil on the elevated site. Revegetation should occur with indigenous species adapted to drier soils. Before emergency dredging, approximately 2.3 of the 9 acres were wetlands, with some emergent aquatic vegetation. In the remaining portion of the site most of the vegetation is upland brush-type. Small willow, cottonwood and locust trees are scattered throughout. A fringe of low quality cattail marsh is located just east of the disposal site. Field inspection by Corps biologists on March 29-30, 1977 indicated that the marsh did not support much wildlife, probably due to the nearness of the airport and area residents, and due to the patchy incidence of the high quality vegetation areas. Wildfowl preferred to frequent other locations in the site area.

4.64 Topography. Due to the low relief, changes in topography of the area during dike construction should have a minimal effect on overland runoff. Sedimentation patterns would change only to the extent that local runoff is diverted. The site is not a prime natural recharge area.

4.65 Water Quality. During construction of the diked enclosure (Site A-1) and north dike transfer structure, some turbidity would occur in the maintenance channel immediately north of the site, in private channels immediately east of the east dike, and in the lake immediately west of the west dike. This turbidity would result during placement of the dike core material which would be obtained from the silty clay excavated from within the confinement site.

4.66 During the transfer operation at the north dike structure, temporary and local turbidity may occur in the maintenance channel during scow unloading of contaminated sediments.

4.67 The confined disposal facility would be equipped with oil skimmer and weir to assure that overflow would be clear. No turbidity would be created by the overflow. Monitoring of the overflow by the Corps of Engineers would assure that any harmful concentrations of contaminating substances do not go undetected. If any harmful concentrations did appear, appropriate measures would be taken to halt them.

4.68 Benthic Organisms established in the recent floodwater sediments of the Sebewaing River channel would be destroyed during construction of the mooring and transfer area at the north end of Site A-1. Species capable of vertical migration through sediments would not be smothered by settling of suspended materials in adjacent areas.

4.69 Waterfowl. The marsh area could not be considered a high quality environment for waterfowl. Redwing Blackbirds and other birds, rabbits, muskrats, and deer identified with this area would be displaced. Construction and operation actions may temporarily create additional stresses upon the resident populations of the marshes to the north and the south. Extension of the runway, which would be allowed by the filling of this area, would cause a long term increase in disturbance of these areas.

4.70 Mammals. Mammals utilizing the marshland would be displaced. Loss of habitat in the marsh and on land would result in inevitable loss of an interdependent association of plants and animals using the area.

4.71 Fish. Portions of the marshland bordering this site to the east, along the canal, could provide a favorable environment supplying spawning, feeding, hiding and resting areas for game and nongame fish species. This habitat would be lost upon filling. Increased sedimentation and turbidity during construction activities could cause temporary adverse effects on adjoining habitats.

4.72 Recreation. Filling in the wetland area of Site A-1 would not significantly prohibit hunting beyond the present State and local restrictions. In addition to hunting, other recreational pursuits are limited due to the close proximity of the airport runway. Public access to the Sebewaing River would be restricted during the mooring and transfer facility construction and continue with scow movement; however, following maintenance dredging, recreational boating opportunities would increase due to the open river channel. Present sediment accumulation in the river has closed the channel to boating.

4.73 Esthetics. Construction and operational activities on the site could produce adverse short-term effects: 1) increase turbidity in surrounding waters; 2) ponding conditions within the site as viewed from the adjacent residential areas; 3) odor during pumpout; 4) increase noise levels; and 5) loss of the scenic quality of a natural area.

4.74 Social and Economic. Filling the upland portions of the site would create land with higher economic potential. Construction of this site could also provide facilities to serve as an interim site, thus decreasing the overall cost of the project and limiting the social disruption that would be created if dredged materials requiring confinement were hauled through commercial, industrial, and/or residential areas. Construction of a dike disposal system on this site would effectively provide protection from wave and storm actions for the east side of Site A-1 replacing and increasing the protection that is provided by the existing lowlands. This site could also serve as a buffer zone between the residential area and air traffic from Sebewaing Airport.

4.75 Long-term economic and social benefits to the area would be realized if the north-south runway is extended allowing increased and safer use of the airport facility.

Proposed Sites A-3 and A-4:

4.76 Sites 3 and 4 are low areas of the Sebewaing Airport east of the airstrip. Clay soils in the two sites are the cause of poor drainage which results in ephemeral ponding. Vegetation on the two sites consists mainly of grasses, forbes and scattered brush. Filling should provide a drier soil and secondary succession woody plants indigenous to adjoining areas.

4.77 These two sites could be used jointly. Site A-3 has a surface area of approximately 5.2 acres and would provide a capacity for 12,500± cubic yards of excavated material when filled 18 inches deep. Site A-4 has a surface area of approximately 8.5 acres and could provide capacity for 21,000± cubic yards if filled to 18 inches deep or 36,500 if filled to a 30-inch depth.

4.78 Water Quality. Ponding and controlled runoff from the area would prevent leaching of excavated material back into the watercourse until such time as vegetation is re-established over the area.

4.79 Soil. Some amount of settling within the dikes could be anticipated of the organic soils underlying this area. Filling of Sites A-3 and A-4 with clean material excavated from within Site A-1 may result in temporary turbidity due to runoff from these sites. Site A-4 drains into the ditch along West Branch Road leading to Saginaw Bay, and Site A-3 drains under the north airport apron into a private channel east of the confinement structure. Any runoff resulting in turbidity in these waters would be temporary and would involve clean sediment only and would disappear upon establishment of planted vegetation cover.

4.80 Waterfowl. Primary effects would be minimal. Some temporary disruption of adjacent marshlands could occur, due to the construction and operation of the dike facility.

4.81 Mammals. Effects similar to the above.

4.82 Fish. No permanent loss of habitat would occur.

4.83 Recreation. No significant impact is expected.

4.84 Esthetics. Short-term effects would constitute a negative contrast to the existing area.

4.85 Social-Economic. No effect.

4.86 Land Use Planning. Utilization of this site could provide additional usable land areas for emergency situations. Top soil excavated from Site A-1 could be stockpiled and used as supplement on substandard soils.

Proposed Site L

4.87 Site L (Lagoon) is a 15-acre site situated on land which is part of the Sebewaing Waste Water Treatment lagoon property. The site could be used to contain all the excavated material in excess of the capacity of previously described sites A-3 and A-4. Due to the distance from the dredging operations, excavated material would need to be trucked to Site L from an interim site.

4.88 Water Quality. No effect. The dike walls and the bottom of the disposal site would be lined with an impermeable material to provide groundwater protection, if needed.

4.89 Soils. No significant adverse impacts are expected. However, replacement of existing land with an unconsolidated sediments will create higher ground and may result in drier soils. Completion of the project may enrich the soils and may potentially provide increase land values, both commercially as farmland or as wildlife habitat resource. This increased value is potential but is unlikely due to the existing and future land use projection in connection with the Sebewaing Waste Water Treatment facility.

4.90 Avifauna. (a) Waterfowl: Impacts to waterfowl will be insignificant due to the type of upland habitat.

4.91 (b) Upland: Impacts to upland species may include temporary displacement during construction and operation and may provide additional stresses to surrounding habitat and/or wildlife populations.

4.92 Mammals. Mammals associated with this meadow environment will temporarily lose their habitat during construction and operation of the facility. With the completion of the project (after the 10-year project life) and the re-establishment of area plant life, these animals will return.

4.93 Flora. Complete or partial loss of up to 15 acres of various forms of indigenous vegetation would occur during construction and operational activities. Revegetation is expected during and after project completion.

4.94 Recreation. No recreational impacts are expected. Recreational activities are restricted on this site due to the waste water treatment complex.

4.95 Social-Economic. No immediate effects are foreseen on the site. Social and economic effects, expected during transportation of the dredged material to the site, would result from increased truck travel from an interim or unloading site through industrial, commercial and/or residential areas. This would result in increased noise levels, traffic congestion, potential spillage from the truck and temporary road degradation caused by the trucks.

4.96 Endangered Plants. No endangered, threatened, or rare vascular plants on the list prepared by the Technical Advisory Committee for Plants for the Program on Endangered and Threatened Species (sponsored by the Michigan Department of Natural Resources) were located or reported for the project area.

4.97 Municipal Water Supplies. There are no municipal water supplies in the project area.

4.98 Potable Water. All potable water within the project area is obtained from domestic, commercial or industrial wells. These wells obtain water from the bedrock within the depth intervals of 60 to 300 feet. The bedrock is everywhere covered with tens of feet of clay materials which protect the bedrock water supply from contamination from above. The confined disposal project would involve activities that affect the surface and near-surface of the land only; therefore, there is no likelihood of threat to the quality of the potable water supply in the area due to the project.

Dynamiting Ice Jams

4.99 Dynamiting activities to remove ice jams in the Sebewaing River have been performed immediately above and below the C&O Railroad bridge, as required, by employees of the Village of Sebewaing. The bottom sediments in this particular section of the navigation channel have been described by the USEPA as mainly ooze with a small amount of sand and a few twigs and have been classified as moderately polluted. Shock waves from the exploding dynamite may resuspend the bottom sediments. These contaminated sediments will be transported downstream with the river currents until they resettle. The intensity of poisonous fumes released from the exploding dynamite is classified as slight(15) and will be principally absorbed by the water. Blasting will be carried out according to Department of the Army Corps of Engineers General Safety Requirements (SM-385-1-1, 1 June 1977, Section XXV).

4.100 Noise. Dynamiting the ice jams creates minimal noise since the explosion occurs under water and the noise is absorbed. The ice is cracked into smaller pieces and flows downstream and into

the bay. Three houses are located in the vicinity of the dynamiting area, and these structures experience slight tremors during the detonation phase of the ice clearing operations. The variable weight explosive charges are set below the ice at given intervals (depending on ice thickness and jam configuration) so as to crack the ice and allow for its downstream movement. The adverse environmental noise and air pollution impacts from the maintenance dredging, structural repair, and dynamiting ice jams will be minimal.

4.101 Fish. The possibility of fish kills has been discussed with the Michigan Department of Natural Resources. The Village officials will be required to obtain a municipal permit for dynamiting from the Michigan Department of Natural Resources. The MDNR will send a biologist to sample for fish kills. The biologist's expenses will be paid by the Federal Government as a part of the authorized flood control project.

4.102 Transportation Structures. No impacts on transportation structures are anticipated. Navigation channels predate most of these structures and the bridges are constructed with full consideration of the channel dimensions. Channel deepening projects are not undertaken without full soil and foundation investigations. Additionally, until 1966, permits were required from the Secretary of the Army acting through the Corps of Engineers for all structures crossing a navigable waterway. This function has since been transferred to the U.S. Coast Guard, but such permit requests are still subject to review by the Corps for compatibility with existing or proposed navigational uses. Dynamiting of the ice jams occurs in the downstream project area in the vicinity of the C&O Railroad bridge. This bridge has a timber superstructure and two concrete footings. Water clearance underneath the bridge is approximately six feet. The small explosive charges are placed at a sufficient distance from the footings and bridge abutments to prevent damage to these railroad foundations.

4.103 Compliance with Laws and Regulations. Corps' activities are governed by Federal Regulations.

a. General

4.104 Several Federal Regulations addressing dredging and disposal operations have been issued in recent years by both the Corps of Engineers and the Environmental Protection Agency. These regulations have certain requirements regarding assessment, public notification, and coordination.

b. 33 CFR 209.145

4.105 On 22 July 1974 the Corps of Engineers published regulations covering all of its dredging operations. This regulation,

33 CFR 209.145, has provisions for issuance of a public notice, holding of public meetings or hearings, if required, coordination of planning with State and Federal agencies, and final approval of disposal sites by EPA. All of the requirements of this regulation will be met prior to beginning maintenance of the project. All activities will also be accomplished in accordance with CE 1300 of June 1973 "Civil Works Construction Guide Specifications for Environmental Protection":

"all emitted water, atmospheric, and noise pollutants will be in compliance with Federal, State and local standards."

c. 40 CFR 230

4.106 On 5 September 1975 the USEPA published regulations for discharge of dredged or fill materials in navigable waters (40 CFR 230). This regulation requires that consideration be given to wetlands, fisheries, shellfish, water quality, benthic organisms, submerged vegetation, nutrients, turbidity, threatened or endangered species, wildlife and recreation. Each of these items have been addressed in detail in preceding paragraphs. In accordance with paragraph 230.5 of this regulation, plans include all practicable measures to minimize adverse effects and enhance beneficial effects. The proposed action is in compliance with the requirements of the regulation.

4.107 During normal maintenance dredging operations, every effort is made to minimize or deter any adverse effects. The inconvenience encountered by pleasure, fishing, and commercial operators can be alleviated through advance notification to the public via public notice publication at marinas, sports equipment shops, yacht clubs and harbor facilities, local mariners' publications, and placement of navigation aids by the U.S. Coast Guard to designate the working areas. Open water disposal will be conducted while the barge speed is reduced to minimize the bottom area influenced by the release of sediments through the bottom doors. Only nonpolluted materials, as classified by Region V, USEPA, will be disposed of at the open water disposal location. Only the specific disposal areas will be used. Contaminated dredged material will be placed in a confined disposal facility.

d. 36 CFR 800

4.108 Pursuant to the Advisory Council on Historic Preservation responsibilities under Section 102(2)(c) of the National Environmental Policy Act of 1969 and the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800) concerning the protection and preservation of historical and cultural resources, the Corps has reviewed, investigated and coordinated concerning

potential project impacts. The Federal Register and subsequent updates have been reviewed, and only one site is listed for Sebewaing. This site is removed from the immediate project area. The State Historic Preservation Officer has been contacted and determined that no known historical sites will be impacted. The open water disposal site for disposal of unpolluted dredged material has been inspected by government divers prior to disposal operations. No impacts on known cultural or historical sites will occur. Preliminary results of the archeological survey are given in Appendix F.

e. Executive Order 11990

4.109 Executive Order 11990, Protection of Wetlands, requires that Federal agencies "provide leadership" and "take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agencies responsibilities"...for construction and improvements". They shall also "avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use".

4.110 Although the project originally proposed the removal of 2.3 acres of wetland this area was, in fact, utilized in emergency dredging of contaminated sediments in September 1977. This was in compliance with the order because there was no other practical environmentally acceptable site for disposal of the dredged materials, and because the amount of wetland which was filled in was reduced as much as possible. The environmental or social impacts from the use of other sites would have been such that the combined negative impacts of the use of sites other than A-1 outweighed the loss which occurred from its use.

4.111 Consideration should also be given to the importance of this small area. It was very limited in size. It was not a sanctuary, refuge, or study area or part of such an area. Due to its location and limited extent, it was not an important nesting, spawning, or rearing area for aquatic or land species. There was also no indication that its loss would harm drainage characteristics, sedimentation patterns, or flushing characteristics. It was not significant in shielding adjacent areas from wave action, erosion, or storm damage. It was not a valuable storage area for storm or flood waters. Although it is a recognized need to prevent the attrition of marshes, the advantages to be gained and the size, the nature, and the position of this area suggest that the use of Site A-1 was justified in spite of the presence of this habitat.

4.112 Related Non-Federal Operations. The environmental effects of operation and maintenance of related privately constructed Federally permitted Section 10 and Section 404 projects are similar to those cited for the proposed action and are considered to be additive. These include dredging, upland disposal of dredged sediments, bulkheading of shorelines, filling, and construction of storage areas. These facilities will provide increased access to Saginaw Bay for local residents and tourists and will result in minor increases in contaminant discharges to the waters of the bay. These impacts will be of an unknown degree.

5. ANY PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

5.01 Those adverse effects which cannot be avoided in the execution of operation and maintenance activities include:

a. Dredging Operations

5.02 Short-term disruption of benthic and planktonic communities, as well as the displacement of nektonic organisms.

5.03 Short-term, minor magnitude adverse impacts due to possible increases in turbidity, COD, solids, and nutrient levels, and decreases in dissolved oxygen levels in the water column and in the down-current direction, depending upon prevailing wind and lake current conditions during hopper overflow.

5.04 Temporary emigration of fish from Sebewaing navigation channels until such time as water quality improves and turbidity decreases, possibly resulting in temporary reduction in recreational fishing potential.

5.05 Periodic disruption to the community caused by continued maintenance dredging operation.

b. Disposal Operations

5.06 Disruption of portions of the 160 acres of lake benthic bottom habitat and fish populations (the area inside the open water disposal site for uncontaminated dredgings). Some benthic organisms may be able to burrow up through the freshly deposited dredged materials, but the remainder will be lost beneath the deposited materials. Long-term impacts will be the prevention of the re-establishment of a mature benthic community at the open water disposal site.

5.07 Disposal of this uncontaminated material on the flood control dikes for upgrading and repair will cause disruptions of the terrestrial life located there. Disposal of this material on the flood control structures will depend upon local cooperation for truck easement access and future maintenance. Some noise may be associated with this land disposal.

5.08 Localized, short-term, low-to-medium magnitude effects on air quality, aesthetics, and aquatic and terrestrial organisms adjacent to the channel where sidecasting or disposal is occurring.

5.09 Short-term adverse impacts of construction included visual impacts at the confined disposal facility and along the haulway to

Sites A-3 and A-4. Impacts in the nearby public road areas to be traversed by trucks bringing in materials include noise, increased safety hazards, and interference with traffic. Other short-term operations impacts include interference with recreational boaters during the movements of the scows in the channel and interference with the migration of anadromous fish during construction and operations.

5.10 Long-term unavoidable adverse impacts include loss of benthic organisms at the mooring and transfer site, and loss of cottonwood and willow trees and shrubs in the upland portion of the proposed Disposal Site A-1. A secondary long-term impact upon adjacent marshland habitats would result from extension of the runway, which would be made possible by the construction of the disposal facility.

c. Structural Maintenance

5.11 Increased turbidity in the water during structural repairs.

5.12 Temporary, low-level adverse impacts on aquatic invertebrates and fish by displacing some of them temporarily from the immediate area during structural repair.

5.13 Temporary, low-level adverse impacts on terrestrial wildlife forced from the project area during reconstruction activities. Recolonization would follow project completion.

d. Dynamiting Ice Jams

5.14 Short-term, low-magnitude adverse impacts on water quality caused by the re-suspension of bottom sediments and release of minor amounts of pollutants and noise in the harbor atmosphere.

5.15 Temporary, low-level adverse impacts on aquatic biota. Invertebrates and fish will be temporarily displaced during dynamiting, and fish and benthos remaining in the immediate project area could be killed by the underwater explosions.

5.16 The Village of Sebewaing officials will be required to obtain a permit for dynamiting from the Michigan Department of Natural Resources. The MDNR will sample for fish kills for the Corps if it is considered necessary by MDNR.

6. ALTERNATIVES TO THE PROPOSED ACTION

6.01 Proposed Plan. The proposed action involves the periodic maintenance dredging of Sebewaing Harbor Federal navigation and flood control channels, construction of a confined disposal for contaminated dredge material, repair of the flood control dikes, revetments and flood gates, and dynamiting the ice jams in the Sebewaing River navigation channel, as authorized by Congress.

6.02 Alternatives. Alternatives to the proposed actions can be separated as dredging alternatives, disposal alternatives, water shed management, and maintenance alternatives.

a. Dredging Alternatives

6.03 Three alternatives can be considered under this category: 1) discontinue maintenance dredging, 2) maintain alternative channel dimensions, and 3) alternative dredge types.

1) Discontinue Maintenance Dredging

6.04 This alternative would jeopardize recreational traffic and eventually hamper all water activities. Within a few years, accumulated sediments would reduce channel use. This is the present status at the river mouth entrance channel. The rate at which the harbor fills is dependent upon sediment loading to the river and the nature and duration of storms and longshore currents in the bay. If no dredging occurs, individuals and enterprises dependent on this mode of transportation for their livelihood would suffer economically.

6.05 The effects of discontinued dredging would result in a long-term, adverse impact on the navigability of the entrance and river channels and might culminate in the complete loss of access to Saginaw Bay for all but recreational craft with the shallowest draft. This loss of access could eventually result in the deterioration of recreational boating facilities in the harbor area. Users of the harbor may eventually find that increased shoaling which limits access to the harbor is both dangerous and undesirable. This alternative was not considered further.

2) Maintain Alternative Channel Dimensions

6.06 This alternative would have a similar effect as the above project proposal. Excessive shoaling would create unsafe conditions for the operation of vessels. The economics of dredging to a lesser depth are not linear, i.e. reducing dredging depth from 8 feet to 5

feet does not cut dredging costs proportionately since a portion of those costs are fixed. Reducing the channel depth from 8 feet, or width from 100 feet (navigation channel) or 70 feet (flood control channel), would restrict vessel traffic and increase flood danger. Adverse dredging effects (turbidity, disruption of benthic communities, etc.) would only be slightly reduced.

3) Alternative Dredge Types

6.07 Three dredge types are utilized for maintenance, depending upon the amount and type of material to be removed, the water depth, and conveyance to and method of disposal at the specific sites. The types are: a) hopper, b) pipeline-cutterhead, and c) bucket (Figure 3).

6.08 Hopper dredges are self-propelled and self-contained dredging units. Their use does not interfere with navigation or movement operations of other vessels. The vacuum type dredging operation is less conducive to shoaling than other types. The primary disadvantage is the 13 foot minimum water depth required to float the vessel; therefore, the size is restricted to larger waterways such as Saginaw Harbor, and this dredge cannot be used to maintain the channels at Sebewaing.

6.09 The alternative types to the hopper dredge are practical and good in certain situations. Hydraulic pipeline dredges are economical when large quantities of material are removed from a small area and may be used in the navigation channels adjacent to the disposal sites.

6.10 A pipeline-cutterhead dredge is preferred for removal of a wide variety of materials, including free-flowing sands, silts, hard clay, and boulders of up to 40 percent of the diameter of the discharge line. The dredge is extremely versatile. The dredge is generally equipped with two stern spuds, and by alternately raising each of the spuds, the dredge excavates transversely across the dredge area and walks into the cut. It has a centrifugal pump that allows the material to be discharged into the hold of the dredge itself, into barges alongside, or onshore. A major disadvantage is possible pipeline interference with vessel movement. Pipeline lengths of 3,000 feet between pump stations are feasible. Long distance pumping is not without problems. Booster stations, pumps, power requirements and extra personnel add appreciably to the system cost. Contaminants leaking from the pipeline may result in temporary, adverse impacts. Hydraulic pipeline dredges can maintain the project depths in the navigation channel.

6.11 The main advantages of the bucket dredge include dredging capabilities in water areas too shallow for hopper dredges and in areas where no suitable land surface is available for conventional dragline operations. In addition, consolidated material may be removed from the navigation channel using this method. Disadvantages of the bucket dredges are: (a) interference with waterborne vessel movement due to dredge and barge placement; (b) less effective sediment removal than with hydraulic dredges due to dredge bucket digging rather than hydraulic dredge vacuuming; (c) the turbidity is temporarily increased due to the disturbance caused by the dredge and the overflow from the barges; (d) the disposal barge must dock and the sediment rehandled in order to unload the dredged material to the confined disposal site. The bucket dredge may be used to maintain all or portions of the Federal channels. Table 6 compares the alternative dredge types.

6.12 Strict cost comparison of different dredge removal operations can be misleading. Each type is best suited for a particular job. Location and amount of work, sediment type and disposal method affect costs. Based on 1969 data (19), the least expensive dredge method was the hopper dredge. Hydraulic pipeline dredges were the next most economical, and mechanical dredges were the most expensive.

b. Disposal Alternatives

6.13 Four alternatives for disposal are discussed: 1) all material disposed in open water; 2) confinement of sediments; 3) upland disposal of sediments; and 4) pretreatment of material.

1) All Open Water

6.14 Open water disposal of polluted sediments would conflict with a request made by the Governor of Michigan to discontinue disposal of contaminated sediments in the open lake waters. The Environmental Protection Agency, Region V, has stated that contaminated sediment is unsuitable for open lake disposal. The Corps operates under Code 33 CFR 209.145(b)(1) governing open water disposal of polluted sediments. No dredging will occur in those portions of the navigation channel currently classified as polluted by the Region V, U.S. EPA until a suitable confined disposal facility is constructed.

2) Confinement or Upland Disposal of Uncontaminated Sediments

6.15 Disposal of uncontaminated sediments in a confined disposal facility is not economically sound due to the construction costs of a diked area. If a confined disposal site is provided by the private sector and is available at no cost to the Federal government, the Corps is authorized to dispose into the site.

6.16 Upland disposal requires an inland discharge area and pipeline, or other means of conveyance. Inland disposal sites are relatively scarce, normally privately owned, and being used for solid waste disposal. Access to disposal pumpout facilities or near-shore areas would normally require an access channel and turn-around area for the dredges. The process of long distance piping has economical, engineering, and logistical drawbacks.

6.17 The impacts associated with dredging are not changed by this alternative. Reduced air and water quality, the removal of harbor sediments and the disruption of aquatic habitat will occur during dredging.

6.18 Land disposal of both contaminated and uncontaminated sediments could be expected to have an effect upon terrestrial vegetation, soils, habitats of fauna and flora and land forms at the disposal site. Transportation of sediment from the lake to the disposal area could be expected to produce impacts on air quality in the immediate vicinity of the route due to emission of gaseous pollutants, dust, odors, and noise. Land disposal of dredged material would have no effect on the aquatic environment of the project area.

6.19 The water areas lakeward of the shoreline in the immediate vicinity of the project contain extensive growths of cattails and bullrushes. Therefore, disposal of uncontaminated sediment for beach nourishment in the immediate project vicinity is not considered feasible.

3) Confined Disposal of Contaminated Sediments

6.20 Six sites were considered for confined disposal of contaminated sediments. A Site Selection Committee consisting of members of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, Michigan Department of Natural Resources, and the U.S. Environmental Protection Agency conducted the inquiries leading to the final site selection. This process began in 1974. The sites are shown in Figure 5.

6.21 Sites A-1 through A-4 were judged to be the most acceptable of all proposals. The Site Selection Committee concurred with disposal of contaminated materials at these four sites. Subsequent consideration of the difficulties of confining contaminated sediments in Sites A-3 and A-4 by the Corps led to the proposed scheme of confining all contaminated material in Site A-1. This alternative would involve fewer adverse impacts and a greater number of beneficial effects than the use of all four sites for confinement of contaminated sediments.

6.22 Site A-5, a parallelogram shaped borrow pit of 11 acres size west of the north airport runway (Figure 5) is part of an area recently (July 1977) given status as a Shoreland Environmental Area by the Michigan Department of Natural Resources.

6.23 Site L is a publicly owned, upland area in the north part of the Township Section 19 situated on Village sewage treatment plant property. The cost of using Site L was considered excessive, since dredged material must be transported by truck or pipeline from an initial holding site in the project area.

6.24 An alternative recommended by the U.S. Fish & Wildlife Service for disposal of contaminated dredge materials was the stockpiling of dredged materials considered unsuitable for open water disposal on Sites A-3 and A-4 for future use by public and private parties for sanding, ice-covered roads, road fill, topsoil, or soil conditioner or for use as construction material.

a. The use of this dredge material as a road fill or other construction material would not be practical because of the high organic content and composition of the dredged material (Table 1) and the economic infeasibility of drying and separating this material.

b. Use of this material for sanding ice roads would not be feasible because of the heterogeneous nature of this material as stated above. Useful sands and gravels would be mixed with nuisance leaves, twigs, clays and other organic silt that occurs during dredging, loading and unloading operations.

c. Use of this material as a soil conditioner could be satisfactory. It would be necessary to stockpile the material on an interim site previous to transporting it to the designated land site(s). To date, no sites for this purpose have been offered. Stockpiling on an availability basis could require a holding site capable of receiving the entire 10-year amount in order to insure a continuity of dredging operations. Selection of a site involves locating suitable public land, identifying compatibility of dredge materials with existing soil characteristics on-site, and insuring that the dredge material does not interface adversely with water systems. The separation or drying of the material is considered infeasible due to excessive costs.

d. The stockpiling of dredged material in the vicinity of the airport could create a possible visibility and obstruction hazard to flight operations. Also, the movement of loading and hauling the equipment in the vicinity of the runways would be difficult to schedule and coordinate with air traffic.

6.25 Marsh Creation: Alternatives for Mitigation. Possibilities for creation of marshland to replace that which would be lost through use of Site A-1 were considered. Establishing a marsh parallel to the south channel breakwall, creating an open water marsh southwest of the channel, and constructing a marsh island complex were evaluated to determine their economic and environmental effects.

6.26 The alternatives could involve the use of approximately 100,000 cubic yards of dredge materials to alter bottom elevations to varying depths, thus supporting a floristic diversification and yielding a high environmental benefit from colonization and utilization by different animal communities. As stated below, however, establishment of marshes can involve great expense.

6.27 For this reason, only the most environmentally advantageous alternative, the marsh-island complex, has been examined in detail.

6.28 Mitigative Action Considered. This action would consist of constructing a back barrier marsh nearshore and adjacent to the lakeward (west) side of Site A-1. The barrier would consist of approximately 1,900 linear feet of clay core dike covered with riprap to a height of 6 1/2 feet above Low Water Datum (LWD). The area inclosed would be in excess of 11.4 acres and position at an elevation of zero feet based on LWD. The type of marsh created could vary from an inland shallow marsh to an inland deep marsh (as defined by the U.S. Fish and Wildlife Service Circular 39). The following impacts are contemplated from such an action:

a. Water Quality: Construction activities would create temporary turbidity in adjoining areas. Depending upon exact site position, water and longshore currents could be affected. Water levels would be able to fluctuate naturally within the protected marsh through breaks in the barrier.

b. Soils: Existing submerged soils on the proposed dike location would be filled over and compressed upon dike construction.

c. Benthos: The original bottom community would be displaced. Changes in water levels and plant cover would induce colonization by a new benthic community.

d. Waterfowl: Construction activities would temporarily remove a potential feeding area for ducks and other wetland species. Upon completion the site could provide a more productive and favorable environment for waterfowl and would probably help to support a larger population.

e. Mammals: No significant adverse impact is expected.

f. Fish: Varieties of game and nongame species using this part of the bay for spawning, feeding, hiding, and resting could be disturbed and temporary loss of habitat would occur as dikes are constructed. Upon completion of construction, the area could provide a more productive habitat, providing better support for fish utilizing the area.

g. Recreation: Construction activities would limit any recreational activities within the area. Upon completion and revegetation, the area could provide an additional recreational area for the public.

h. Social-Economic: No immediate adverse effects are foreseen. Decreased recreation usage would be of economic benefit. While some of the alternatives are probably more environmentally desirable than the proposed plan, particularly the marsh-island complex, the costs of such plans make them infeasible. A rough estimate for the necessary dike construction in deep water (6 feet) indicates that costs could run from 2 to 3 million dollars or more. The environmentally acceptable inland sites are more feasible.

6.29 Without an acceptable site provided by a local sponsor according to provisions of Public Law 91-611, no dredging will be done. The channel is already filled with sediments to the extent that movement of recreational craft is precluded. Area businesses that are dependent upon transient, as well as local boater commerce, would suffer, even though the environmental impacts of disposal would be absent with this alternative.

6.30 In terms of economics, practicality, irretrievable resources, and ecological disruption, the process of confined dike disposal offers the best solution at the present time.

4) Pretreatment

6.31 Treatment of dredge material could be accomplished in several ways: (1) local sewage treatment works; (2) separate onshore treatment plant; and (3) on-board treatment prior to in-lake discharge.

6.32 Assume the removal of a moderate amount of dredgings, i.e., 1,000 cubic yards of material per day. An 0.5 percent slurry of that amount would be a volume equivalent to the wastewater discharge of 0.25 million people (11). Existing sewage treatment plants do not have the capacity to treat these additional volumes. Costs for new treatment plants are prohibitive and chemical treatment to settle the suspended solids is expensive. In addition, chemical flocculation in conjunction with open lake disposal could cover lake bottoms with sediments unsuitable for biological production.

c. Watershed Management and Pollution Control

6.33 Pollution abatement and land management for erosion control could reduce the need for dredging operations. Studies are underway to determine the cost of land retention of sediments. Many governmental units are involved with watershed erosion control. Some are the U. S. Army Corps of Engineers' Waterways Experiment Station, U. S. Geological Survey, State Conservation Agencies, Soil Conservation Districts, Co-operative Extension Agents and land planning units of universities.

6.34 Pollution abatement of point source discharges and stream bank erosion control has and will continue to reduce loadings of total solids to Saginaw Bay and other public waters. Erosion control of non-point sources covers many facets ranging from local zoning and green belt usage through construction practices. Reductions of contaminants discharged to the environment does affect society and those costs are ultimately passed on to the consumer as higher prices for goods and services. While technically feasible, the implementation of erosion control measures for the single purpose of reducing channel shoaling is not economically viable. Furthermore, this alternative is beyond the scope of authority under which the Corps maintains Sebewaing Harbor, and implementation and funding of erosion control programs would be the responsibility of local municipalities and private interests in and along the watershed. Although erosion control measures could have a long-term effect on maintenance activities by reducing sediment volume and dredging frequency, they would not completely eliminate the need for future maintenance dredging in Sebewaing Harbor.

6.35 Future dredging and disposal needs for the Sebewaing River area are uncertain. Reductions of industrial and municipal inputs will result in reduced sediment loadings with potentially less dredging. Dredging will still be required due to shoaling caused by littoral drift and overland runoff. If the NPDES program functions correctly, certain portions of harbors now classified as polluted and unsuitable for open lake disposal may be reclassified as suitable for open lake disposal. Unpolluted sediments remain suitable for open water disposal.

d. Structural Maintenance Alternatives

6.36 Four alternatives can be considered under this category: 1) discontinue structural and project maintenance 2) maintain portions of the structures and projects 3) remove structures in the floodplain, and 4) flood insurance.

1) Discontinue Structural Maintenance

6.37 Residential and industrial structures currently located in the Sebewaing River flood plain would be further jeopardized with potentially severe economic and social implications. Failure to maintain the flood control structures and project dimensions in the Federal flood control project area would allow for the inundation of large portions of the village during periods of high river discharge with resultant property damage and the potential loss of life.

2) Partial Structural Maintenance

6.38 Maintenance of portions of the flood control project would have a similar effect as the previous alternative. A break in any portion of the flood control dikes or stop log structures would allow the river water to flow into the flood plain. Failure to maintain the authorized flood control channel dimensions would have a similar impact in that increased flood potential is proportional to reduced channel dimensions.

3) Removal of Flood Plain Structures

6.39 If either of the previous alternatives are enacted, severe economic and social implications would result. Many fine homes and cottages are located in this area. The social implications and economic cost of the removal and displacement of people and structures from the flood plain are excessive. This alternative was considered and determined to be not feasible.

4) Flood Insurance

6.40 Even with proper maintenance of the flood plain structures, the potential exists for flooding. Federal flood insurance is available to those structures lying within the designated flood areas. This is not a true alternative, but rather a social and economic relief system for catostrophic events.

e. Ice Jam Clearing Alternatives

6.41 The social and economic implications from the failure of authorities to remove the threatening flood potential of ice jams create impacts similar to those which would result from the failure to maintain the flood control structures and channel dimensions. All portions of the flood control project work in conjunction. Maintenance and repair of the channel and structures is ineffective if ice blocks the river, and prevents adequate discharge through the channel with the resultant overtopping of the dikes. Alternatives under this category can be divided into two solutions: 1) clearance of ice jams, and 2) prevention of ice formation.

1) Clearance Operations

6.42 Ice jam clearing operations contain two alternatives, dynamiting ice jams or use of ice breaker vessels. Dynamiting ice and ice jams in the vicinity of the C & O railroad bridge lessens the chance of flooding by breaking the sheet ice that forms dams in this area of the river channel. Dynamiting the ice jams is relatively inexpensive, site selective, and fast.

6.43 Shallow draft ice breaking vessels are not practical and the closest ocean going vessel is the U.S.C.G. MACKINAW located at Cheboygan, Michigan. Insufficient draft and turning space is available for such an operation. The maintenance and upkeep of such a craft, specifically for one or two days of work a year, is not feasible.

2) Prevention of Ice Formation

6.44 Two alternatives are considered. They are the bubbler system and heated water discharge. The bubbler system is not a unique or new concept. The bubbler line is constructed of polyethylene pipe with 3/64" openings. The system is supplied with compressed air at a rate of 30-40 pounds per square inch, and weighted cable and contrete keep the system on the bottom.

6.45 The water freezes to ice at 32°F with warmer water located at deeper depths. Convection currents produced by rising air columns (bubbles) carry warmer bottom waters to the surface when the waterbody is ice bound. Circulating warmer water from the bottom erodes the ice cover, forming pockets of open water over the bubbler site and weakened ice conditions around the open water perimeter. Excluding initial installation costs, maintenance and operating costs, the system requires deep, stratified bottom water. Water depths in the river are not adequate for this operation.

6.46 Heated water discharges can maintain open water in ice bound areas. This method requires a heated water discharge. One readily available source is the sugar processing plant located at Sebewaing. This company has installed waste treatment lagoons to meet the State of Michigan surface water discharge compliance program. Discharge of this untreated, hot water would violate Michigan's discharge standards. Additional costs of pipeline construction, maintenance, and removal from the channel during dredging operations make this alternative infeasible.

7. RELATIONSHIP BETWEEN SHORT-TERM USE OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 Short-Term

The major, short-term effect of maintenance operations is that Sebewaing Harbor Channels will continue to be navigable for commercial and recreational vessel movement. This continued navigability will help avoid economic burdens to local businesses dependent upon waterborne transportation for portions of their income. Recreational boaters derive social and aesthetic values from continued use of the harbor facilities.

7.02 Dynamiting the ice jams reduces or prevents flooding to portions of the residential and business community. This action minimizes economic loss and provides for social well-being of the community.

7.03 Negative effects include increases in turbidity due to dredging, disposal, and maintenance, which may temporarily disrupt the ecology of the harbor area, and aesthetically affect water appearance. Dredging activities will resuspend sediments and some contaminants, particularly along the sediment-water interface. Benthos occupying the dredging and disposal areas will be disrupted and wildlife currently living on the disposal sites will be displaced. Mature fish would probably avoid the immediate dredging area but larval fish may be impacted. Minor navigational hazards due to the presence of dredging equipment may interrupt and inconvenience watercraft movement.

7.04 Dredge disposal operations will disrupt the biota of the open water and terrestrial disposal sites. Loss of habitat in the marsh and on land would result in inevitable loss of an association of plants and animals using the area. Maintenance of the structures may also disrupt terrestrial wildlife. Recolonization could occur shortly after maintenance operations cease with species more adapted to the changed conditions such as higher and drier soil.

7.05 There will be short-term adverse impacts in connection with construction and operating of the confined disposal facility. However, confinement of sediments which are unsuitable for release into open waters contibutes to the long-term improvements in the trophic condition of Sebewaing Bay, Saginaw Bay, and the Great Lakes.

7.06 Construction and operational activities of the disposal facility could temporarily create additional stress on the adjacent marsh areas and nesting waterfowl populations.

7.07 Long-Term

The greatest, long-term effects are the social well-being of an urban populace brought about by economic benefits attributed to the reduction and minimization of flooding at Sebewaing. Recreational benefits attributed to waterway also contribute to the health and well-being of the populace.

7.08 If sedimentation is not controlled, the maintenance dredging project will eventually encroach upon open waters of the lake. The open water disposal actions will most probably be irreversible. Long-term dredging operations may reduce species composition in the navigation channels and disposal site, and maximum sustained benthic populations may never be achieved.

7.09 Filling wetlands and upland portions of the site would create land with higher economic potential. Construction of a diked facility on the proposed site would effectively provide protection from wave and storm actions now experienced by marsh and lowlands. The site would serve as a buffer zone between marshy shorelines, the residential area and our traffic from Sebewaing Airport.

7.10 Development of this site for an extension of the Airport would enhance the value and safety of the Airport for long-range community benefits.

8. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.01 Implementation of the proposed operations would result in the expenditure or elimination of various natural and human resources. In order to evaluate resource commitments that can be expected to occur as a result of proposed project activities at the Sebewaing Harbor navigation channel the following definitions are made.

a. "Irreversible or irretrievable commitments" are defined as those commitments of resources for periods of no less than 50 years.

b. "Natural resources" are defined as the physical and biological components identified in Section 2, including hydrology, physiography and geology, plant and animal life, bottom sediments, and the acquatic ecosystem.

c. "Human resources" are defined as those environmental components directly associated with man's activities, including land and water uses, transportation, structures and utilities, public services and facilities, industry and business, employment and income, recreation, demography and cultural resources.

8.02 The labor, material, and fuel committed for the maintenance operations at Sebewaing Harbor are not retrievable and may be considered as committments of resources for present and future generations. Disposal of dredged material into the open water and onto the structures, construction of a 9 acre diked disposal facility and covering 13.7 acre sites (2) with excavated fill, use of explosives and structural materials, are generally considered irreversible and irreterievable uses. The dredged sediments are not in shore supply and represent no major natural resources in their present form.

8.03 Benthic organisms would be eliminated from the dredging, open water disposal, and dynamited area through sediment disruption. However, recolonization should occur and disruptions should not significantly impact the total bay biology. Terrestrial organisms could be temporarily displaced during disposal and structural repair operations.

8.04 Approximately 9 acres of coastal lowland will be converted to higher, drier land by the diked disposal facility for future airport use.

9. COORDINATION, COMMENT, RESPONSE

9.01 Public Participation. No public meetings, hearings, or workshops have been held concerning maintenance dredging, dynamiting or structural repair operations because the harbors and navigation channels were established as the result of Congressional legislation and the maintenance thereof was inherent in the Federal jurisdiction over navigable waterways.

9.02 On October 28, 1976, the Corps conducted a public workshop in the Sebewaing Village Hall. Five possible sites were presented - A-1 through A-4 and L. The dike disposal site being built near the mouth of the Saginaw River was recommended as a possible site. However, the Saginaw site is being sized for ten-year dredging from the Saginaw River Bay and channels, and can not accommodate materials from other harbors. It was commented that the Sebewaing Harbor should be dredged soon because water depth may not be adequate for navigation in the near future and a constricted channel may cause flood waters to back up. A question was asked about the source of pollution in the harbor. The Corps responded that the pollution type includes low dissolved oxygen content and high coliform and nutrient levels.

9.03 Most of the public workshop involved discussion of Site A-1 and related items. Local support for Sites A-1 through A-4 was strong. The comment was also made that Site A-1 is currently a mosquito haven which should be covered up. Local hunters said that there are few ducks in the Site A-1 area. Others remarked that development of Site A-1 would allow extension of the airport runway and that the State had given over the Site A-1 area to the County in 1961 for that purpose. Local residents adjacent to the runway extension indicated they did not object to development of the site or the runway extension. Congressman Traxler stated that development of Site A-1 and others as necessary seemed to be best for the community. He inquired as to the position of the Environmental Protection Agency and Fish and Wildlife Service on Site A-1. The Fish and Wildlife Service representative said they were against the development of Site A-1. No Environmental Protection Agency representative was present to comment. The State Department of Natural Resources representatives stated that they had not completed their review of the sites yet. It was suggested in connection with Site A-1 that a breakwater should be built along the south side of the river entrance channel parallel to the existing spoil dike on the north side of the channel to improve the boat refuge capabilities of the harbor. The comment was also made that Site A-1 development would facilitate construction of additional recreational boating facilities in the harbor.

9.04 The U. S. Fish and Wildlife Service and Michigan United Conservation Clubs opposed the use of any wetland areas for confined disposal in the Sebewaing area. This applied previously to Site A-1.

9.05 A compromise was reached 29 June 1977 between EPA, USF&WS and the Corps to limit the size of the proposed facility to exclude as much of the marsh as possible. The resulting design included approximately 2.3 acres of marsh and 6.7 acres of fastland. It was agreed that sites A-2, A-3, A-4 and L were also acceptable for fill in excess of the capacity of Site A-1.

9.06 The current practice is to issue a Public Notice of the intent to perform maintenance dredging in the specified Federal Navigation Channels and/or Harbors. This maintenance work is reviewed for compliance with the following laws: the Fish and Wildlife Act of 1956, the Fish and Wildlife Coordination Act of 1958, the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1968, the Federal Water Pollution Control Act of 1972, and the Endangered Species Act of 1973, as well as the various Congressional Acts authorizing construction and maintenance of the Federal project.

9.07 Any person who has an interest which may be affected by the proposed activities may request a public hearing. The request must be submitted in writing to the District Engineer within thirty (30) days of the date of the Public Notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity.

9.08 Environmental Review. The Draft and Final Environmental Statements have been sent to the following agencies and interested citizen groups.

Federal Agencies

U. S. Advisory Council on Historic Preservation
U. S. Coast Guard
U. S. Department of Agriculture, Soil Conservation Service, Bad Axe, Michigan, and Caro, Michigan

U. S. Department of Commerce
U. S. Department of Interior
U. S. Environmental Protection Agency
U. S. Geological Survey
Federal Energy Administration

State of Michigan

Department of Natural Resources
Department of Commerce
State Highways and Transportation
State Historic Preservation Officer
Michigan Department of Public Health, Thumb District

Local Governmental Units

Village of Sebewaing
County of Huron
East Central Michigan Regional Planning and Development Commission

Citizen Groups

Audubon Society, National
Bay County League of Women Voters
Ducks Unlimited
East Michigan Environmental Action Corporator
Historical Society of Michigan
Izaak Walton League
Michigan Audubon Society
Michigan Duck Hunters Association
Michigan Natural Areas Council
Michigan United Conservation Clubs
National Wildlife Federation
Port Huron League of Women Voters
Saginaw Audubon Society
Saginaw League of Women Voters
Sand Point Association

9.09 Comments on the Draft Environmental Statement and responses to them are listed in the following section. Copies of the original correspondence are included in Appendix E.

U. S. DEPARTMENT OF COMMERCE: NOAA - NATIONAL OCEAN SURVEY

1. Comment: Geodetic control survey monuments may be located in the vicinity of the proposed disposal sites. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.

Response: If distrubance or destruction of geodetic survey monuments could arise from project activities, the National Ocean Survey would be notified in time for their relocation.

U. S. DEPARTMENT OF COMMERCE: NOAA - ENVIRONMENTAL RESEARCH LABORATORIES

1. Comment: Volume of polluted sediment deposits in the river depends on Lake Huron level and river flow. With lake levels going down, more of the highly movable ooze will be transported and deposited in lower river reaches and in the lake. The location and volume of polluted deposits should be ascertained prior to the dredging.

Response: Project sediments have been and will be sampled periodically. Changes in sediment position and volume in the Sebewaing River authorized channels are identified previous to dredging by the Corps.

U. S. DEPARTMENT OF TRANSPORTATION - FEDERAL HIGHWAY ADMINISTRATION

1. Comment: It is noted in the probable impacts section 4.27, only the noise and air impacts directly associated with the dredging operations and structural repairs are addressed. Section 5.09, however, also indicates other short term impacts from hauling are expected, including noise, safety, etc. It is recommended the probable impacts section include discussions of hauling impacts such as noise, dust, safety, etc., since they are construction impacts.

Response: These impacts are discussed in paragraph 4.94 of the draft statement. Discussion in Section 4 (probable impacts) was divided into: construction, operation, and maintenance of Sebewaing Harbor (pp. 41-60); construction and operation of the confined disposal facility; (pp. 61-66) and dynamiting ice jams (pp. 67-68). The heading for the middle section was inadvertantly omitted. The correction has been made in the final statement.

U. S. DEPARTMENT OF THE INTERIOR

1. Comment: To avoid or minimize conflict with recreational boating,

the letter report should include specific provisions for maintenance dredging of the channel to occur outside the prime recreation season. This is alluded to in the second paragraph on page 7 of the letter report, which states that, "It is anticipated that future maintenance dredging of the entire channel will be done in early spring or in the fall to avoid interference with recreational boating traffic in the river."

Response: The Sebewaing letter report addresses only the disposal facility, not maintenance dredging or flood control. To avoid interference with recreational boating, it is being recommended that dredging occur before 1 July and after Labor Day.

2. Comment: The State Historic Preservation Officer has reviewed the proposed project as indicated by an appended letter (DES, p. E-2). However, the final environmental statement should document further corresponsence with SHPO regarding on-land disposal sites as requested in her letter (DES, P. E-2). If the SHPO recommends archeological surveys of the proposed disposal sites, such surveys should be conducted prior to the preparation of the final document so that survey methods and resource evaluations can be discussed in the document. If any discovered sites are deemed eligible for inclusion in the National Register of Historic Places, the final statement should reflect measures taken to comply with Section 106 of the National Historic Preservation Act of 1966.

Response: Additional correspondence with the State Historic Preservation Officer is included in Appendix E. The Final Statement also includes results of an archeological survey conducted with respect to the project (Appendix F). If sites are discovered which qualify for inclusion in the National Register, measures would be taken to comply with the Historic Preservation Act. (p. 43).

3. Comment: In general, the draft environmental statement does not adequately assess the environmental impacts from the disposal of non-polluted dredge materials into the aquatic environment at the mouth of the Sebewaing River. There seems to be confusion as to whether the south breakwater will be reconstructed at the mouth of the Sebewaing River, and if so, to what extent the resulting impacts will be on fish and wildlife resources.

Response: The south breakwater would not be reconstructed, since it is not a part of this authorized project. It consisted of hard clay material from excavation of the authorized channel, begun in 1893. The breakwaters on both sides of the channel were of such hard consolidated material that they survived until the high water and storms of the winter of 1972-73 when both were largely eroded away. The last dredging and side casting by hydraulic dredge of soft unconsolidated material over these breakwaters (principally the south breakwater) occurred in 1968. Present planning is to use only the designated area in the lake for disposal of clean dredged material. It should be noted, however, that the breakwater probably provided

protection for boaters and for the marsh behind it.

4. Comment: On page 6, paragraph 1.19 states that the disposal of uncontaminated dredged materials will be into the nearshore areas, if possible; and in the areas on or adjacent and parallel to the north or south channel breakwater. At present there is no south breakwater. Replacement of the south breakwater will destroy aquatic habitat. Disposal of the uncontaminated dredged materials into nearshore areas could have adverse impacts on fish and benthic organisms and these potential impacts should be addressed.

Response: The statement referred to has been deleted for reasons stated above (Comment, Response No. 3). It should be noted that the storms and high water of 1972-73 destroyed aquatic habitats and removed a protection barrier which probably has resulted in significant changes to fish and aquatic habitats in adjoining marsh areas.

5. Comment: Inasmuch as channel sediments contain excessive concentrations of toxic substances (p. 22, par. 2.37 and 2.38), measures such as sediment barriers should be considered to minimize the migration of contaminated suspended material within the turbidity plume during dredging operations.

Response: Elutriate tests have indicated that under the oxygenated conditions generally present during dredging operations there is little or no release of nitrate, organic nitrogen, total phosphous, orthophosphate, copper, lead, cadmium, iron or PCBs.* Manganese and ammonia, if present, may be released, but the dilution factor at dredging sites (especially in rivers) should be more than enough to prevent impact on freshwater organisms in the area.

Under relative quiescent conditions, turbidity curtains can be effective in lowering downstream turbidity levels. However, most harbors and almost all rivers dredged have flows and currents which reduce or eliminate this effectiveness. In certain situations higher turbidity levels have been measured downstream from the curtain than inside it. Turbidity curtains also increase manpower, training, and equipment requirements, thus increasing dredging costs. Turbidity curtains can also be navigational hazards.

6. Comment: On page 31, paragraph 2.70 again states that the noncontaminated dredged material is proposed for disposal on the river mouth breakwaters and to areas immediately adjacent to the outside surfaces of these structures. The impacts of such proposals should be addressed.

* U. S. Army Corps of Engineers, Waterways Experiment Station. Research Study for Development of Dredged Material Disposal, DMRP D-75-4, November 1975.

Response: This section has been changed deleting breakwater-related sites. Please refer to Comment-Response No. 3 above.

7. Comment: Page 35, paragraph 2.82 should be corrected to indicate that only one breakwater exists today. Reconstruction of the missing breakwater on the south side of the channel in the same manner as before will impact the aquatic habitat.

Response: The referenced paragraph has been changed in order to describe project conditions as they are today. Currently, it is proposed that the material removed from that portion of the project area found to be suitable for open lake disposal would be placed in the former lake disposal site. Reconstruction of the south breakwater would not be carred out.

8. Comment: Page 50, paragraph 4.29 discussed the impact of placing the materials on the breakwaters and the effect on terrestrial wildlife. Effects on the aquatic organisms should be included.

Response: This section has been revised to exclude disposal of dredged material on or near breakwaters.

9. Comment: Page 53, paragraph 4.41 references the U. S. Fish and Wildlife Service as a source of information concerning the quick recolonization of dredged areas and disposal sites by benthic organisms. Identification of the type of communication, whether personal or a reference study, would fully document this important reference on benthic recolonization. This would allow future environmental impact statements and other persons who rely on the factual information contained in such documents, to accurately assess the findings.

Response: The general pattern of succession is dependent upon the nature of the physical environment and the structure of surrounding communities. Initial recolonizers tend to have short generation times, small size, low fecundity and high larval availability. The less mobile and "opportunistic" species recolonize during later phases. Reference to the Fish and Wildlife Service has been deleted.

10. Comment: Page 73, paragraph 5.07 should be corrected to depict what will actually happen to the uncontaminated dredged materials in depositing or upgrading the existing channel protection sidecast structures at the river mouth. Will the southern sidecast structure be rebuilt? If so, to what extent will its reconstruction impact the aquatic environment?

Response: Uncontaminated materials suitable for open lake disposal will not be used to rebuild or upgrade the structures at the river mouth (see Comment-Response No. 3). These materials would be placed in the former open lake site.

11. Comment: On Page 80, paragraph 6.22, the first sentence should be corrected. The U. S. Fish and Wildlife Service does not judge the 11-acre borrow pit west of the airport to be a valuable waterfowl staging area.

Response: The sentence referred to has been corrected to indicate concurrence with Site A-1.

12. Comment: Page 94, paragraph 8.03 states that terrestrial organisms will be displaced from the disposal breakwaters and structures during disposal and structural repair operations. If the south breakwater is constructed there will also be permanent loss of aquatic habitat at that site. The reconstruction of the south breakwater appears to be an unnecessary action. The past history at Sebewaing indicates that high waters have eroded the south structure. It is our opinion that the replacement of the south structure is not justified and appears unnecessary.

Response: As explained in preceding comments there are no plans for reconstruction of the south breakwater.

UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE

1. Comment: We favor the use of Sites A-1 through A-4 as described in Section 6, because alternate sites would have an adverse effect on wetlands or on upland vegetation. We endorse the creation of marshes to mitigate the cumulative losses of wetlands, an increasingly scarce resource.

Response: Your concurrence on the use of Sites A-1 through A-4 is noted. Your endorsement of marsh creation is appreciated.

U. S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

1. Comment: We have reviewed the draft Environmental Impact Statement for the operation and maintenance, confined disposal facility, and flood control facilities at Sebewaing, Michigan. We have no comment to make.

Response: Thank you for reviewing the Statement.

ENVIRONMENTAL PROTECTION AGENCY

Comment: As indicated above, our office, as well as the U. S. Fish and Wildlife Service and Michigan Department of Natural Resources, worked extensively with your staff to select a site for confined disposal at Sebewaing which would allow social benefits to be derived from disposal yet would minimize wetland impacts. From the information presented in the Draft EIS, it appears that spoil obtained

from the September 1977 emergency dredging was placed on the wetland area which it was agreed to protect. Consequently, we believe remedial measures to rehabilitate the wetlands impacted by emergency dredging should be developed and included in the Final EIS. We offer the following additional comments for your use in preparing the Final EIS.

Response: Dredged material placed on protected wetlands by the emergency dredging operation has been removed. Further filling will be within limits of the project in Site A-1 as agreed.

2. Comment: Pages B-20 and B-23 list our Agency's old criteria for determining acceptability of dredged spoil disposal. The old criteria should be replaced with our April 1977 "Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments", a copy attached. Also, the letter Report for Diked Dredge Disposal Area should contain our April 1977 Guidelines along with the most recent sediment survey results.

Response: The April 1977 Guidelines are included in EIS and will be included in the future letter reports. The most recent sediment survey results are included in the Letter Report.

3. Comment: On Page 39, paragraph 3.08, the U. S. Environmental Protection Agency should be added to the list of those who agreed to limit the size of the proposed facility to exclude as much of the marsh as possible.

Response: This has been noted in the FEIS.

4. Comment: Minutes from the June 29, 1977, Site Selection Committee Meeting on Sebewaing show that, originally, Site A-1 was planned to hold 20,000 cubic yards of spoil, the balance of the material being placed in Sites A-2, 3, and 4 and Site L or Site A-5. We note from the Draft EIS that it is proposed to excavate Site A-1 to allow for a capacity of the total 84,000 cubic yards. Sites A-3 and A-4 would then be filled with the material excavated from A-1. It is assumed that material excavated from A-1 is unpolluted and that runoff from A-3 and A-4 would involved clean sediment only. It should be explained on what basis the material from A-1 was determined to be unpolluted. Also, it should be determined if enlarging the capacity of A-1 will affect the water regime within the surrounding wetlands.

Response: The material from A-1 was subjected to chemical analysis. The results are included in Appendix C. The water regime in the surrounding wetland should not be significantly affected. The data indicates that the soils to be placed on Sites A-3 and A-4 would make good top soil. This has been coordinated with your agency, which is in concurrence.

5. Comment: The Final EIS should indicate who will be monitoring the overflow from the confined disposal facility.

Response: The Corps of Engineers will monitor the overflow from the confined disposal facility at the time that it occurs. This information has been added to the FEIS (Sec. 4.67).

6. Comment: Through verbal communication with your staff, our Agency was requested to determine if open lake disposal would be acceptable for Sebewaing. Considering the potential for upland disposal at Sebewaing, restricted open lake disposal would be unacceptable.

Response: This determination has been noted in the FEIS.

7. Comment: In accordance with U.S. EPA's procedures, we have classified our comments on the proposed project as ER, environmental reservations, and rated the Draft EIS as Category 2, additional information required.

Response: Additional information requested is included in the Final Environmental Statement.

MICHIGAN DEPARTMENT OF STATE - MICHIGAN HISTORY DIVISION

1. Comment: We have reviewed the Draft Environmental Statement, Letter Report for Diked Disposal Area: Sebewaing, Michigan. We note that the statement contains no reference to our October 1, 1976 communication regarding the project (copy enclosed), in which an archaeological survey was requested for certain alternatives. The designated areas, should, if proposed for impacts, be surveyed prior to construction.

Response: The October 1 letter is included in the correspondence in Appendix E. As coordinated with Dr. Finfer of your office, a preliminary archaeological survey of Sites A-1, 2, 3, and L has been completed. A field survey will be completed as the weather permits. Any significant findings will be reported to your office and appropriate action taken.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

1. Comment: We have reviewed the subject reports and determined there will be no adverse long-term effects on water quality or aquatic life. The proposal is accurately presented and responds in an acceptable manner to the needs for disposal of spoil material from this project.

Response: Your determination that there would be no adverse long-term effects on water quality or aquatic life is noted. Thank you for your review of the draft statement.

MICHIGAN UNITED CONSERVATION CLUB

1. Comment: In our June 22, 1977 letter, MUCC objected to the project as proposed due to the filling of wetlands. We again refer to that

letter and note that Executive Order 11990 on the Protection of Wetlands does apply to this project. It states that "each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction..."

The DES discusses "Compliance with Laws and Regulations" (p. 68-70). However, the Executive Order is not mentioned. No explanation is offered as to how this proposed project will comply with that order. No alternative solution is discussed if no wetlands are filled. For example, could that incremental loss by decreasing the size of Site A-1 be made up by disposal on Sites A-3 and/or A-4? Could Site A-1 be excavated to a greater depth to accommodate additional fill? Are there other alternatives to eliminate the need to fill marshland? What are the relative costs of avoiding marsh filling?

Response: Your continued opposition to the filling of any wetlands is noted. Information concerning Executive Order 11990 is included in Section 4 of the FES under "Compliance With Laws and Regulations". Other alternatives have been exhausted. The wetland area in Site A-1 was filled when emergency dredging of the contaminated inner portion of the river took place in September 1977 for flood prevention. A somewhat larger area of wetland was utilized than approved by the U.S. Environmental Protection Agency and the Fish and Wildlife Service. Since that time, the dike has been moved to an acceptable position and the elevation has been restored (see paragraph 1.16).

2. Comment: In our June 1977 letter, we stated that we could not support near shore marsh restoration to mitigate lost wetlands. However, if wetlands are to be filled in spite of our objections, mitigation should be considered. The DES mentions the possibility of such mitigation, but is ambiguous as to whether it is a part of the proposed action. Our understanding is that such mitigation has been deleted from consideration. Why?

Response: Reduction of the width of the original A-1 Site to the present size (150 feet on each side of the center of the airport runway) was accepted as a mitigative measure to minimize the amount of wetland which construction of the disposal facility would replace. Other reasons for dropping construction of an off-shore wetland area are given in the alternatives section of the FES.

3. Comment: The size of the proposed Site A-1 is not consistent in the DES. On page 7, it is 9 acres; on page 32, 11-12 acres; on page 60, 11 acres; and on page 96, 11-13 acres. The wetlands proposed for filling on Site A-1 vary from 2 to 3 acres in the DES.

Response: According to the limits of the disposal area agreed upon by the Corps of Engineers, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service, the disposal area would be 9 acres in size, of which approximately 2.3 acres were wetland. The figures have been corrected in the FES to be consistent. Part of this area, including the 2.3 acres of wetland, was utilized for disposal of contaminated sediments in emergency dredging.

4. Comment: A discussion of the "Watershed Management and Pollution Control" is included on pages 85-86. The DES downplays the importance of such controls ("not economically feasible," "would not completely eliminate the need for future maintenance dredging"). It states that "reductions of contaminants discharged to the environment does affect society and those costs are ultimately passed on to the consumer as higher prices for goods and services." Is that offered as a justification for poor soil management practices in the Saginaw Bay Watershed? No mention is made of the increased costs to taxpayers of dredging lost topsoil from our waterways, the costs of containing that polluted material, the cost to society from increased pollution and turbidity in the Saginaw Bay, and the long-term costs to society of mining productive topsoils.

Response: This section points out the potential for watershed erosion control through regulation of both point and non-point sources. Such controls are beyond the regulatory authority of this agency. While the costs mentioned in this comment are real, they cannot be quantified. It should be noted that other agencies, including the Michigan DNR, the Soil Conservation Service, and the U.S. EPA are working for solution of these very real problems, which should reduce dredging needs in the future.

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3. U.S. Environmental Protection Agency, Saginaw Bay: An Evaluation of Existing and Historical Conditions, the University of Michigan Great Lakes Resource Management Program, April 1974.

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11. U.S. Army, Corps of Engineers, Buffalo District, Dredging and Water Quality Problems in the Great Lakes, Summary Report, Volume 1, March 1969.

12. U.S. Department of Commerce, 1970 Census of Population, Number of Inhabitants, Michigan, July 1971.

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18. Lee, G.F. and R.H. Plum, Literature Review on Research Study for the Development of Dredged Material Disposal Criteria, U.S. Army Corps of Engineers, Waterways Experiment Station, T.R. D-74-1, June 1974.

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20. U.S. Department of Commerce - Climatography of the United States, No. 81, August 1973.

21. Michigan United Conservation Clubs, Guide to Fun in Michigan.

22. Michigan Department of Natural Resources. Summary Report, Lake Huron Studies, Water Quality Appraisal Section, Great Lakes Group.

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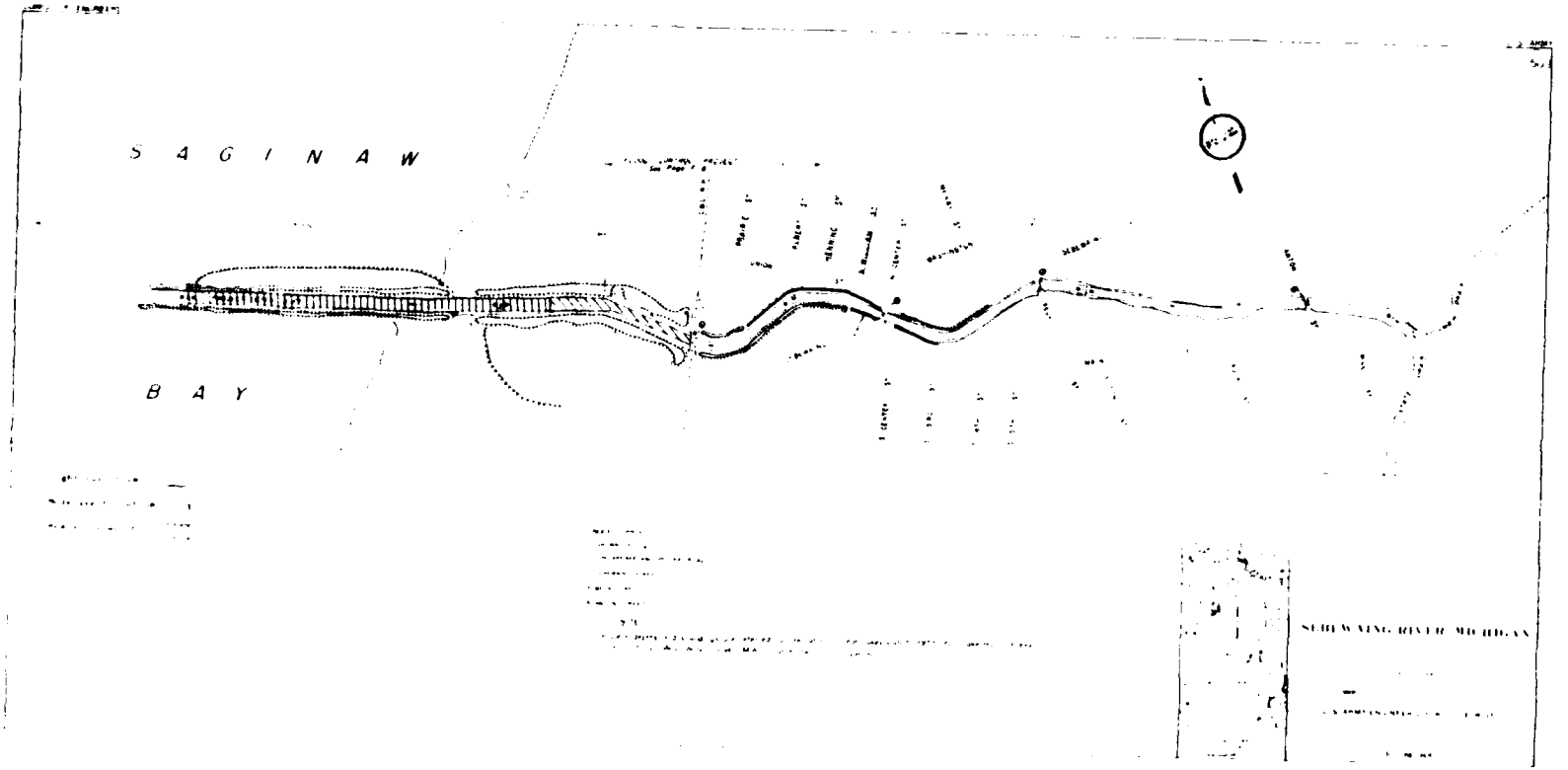
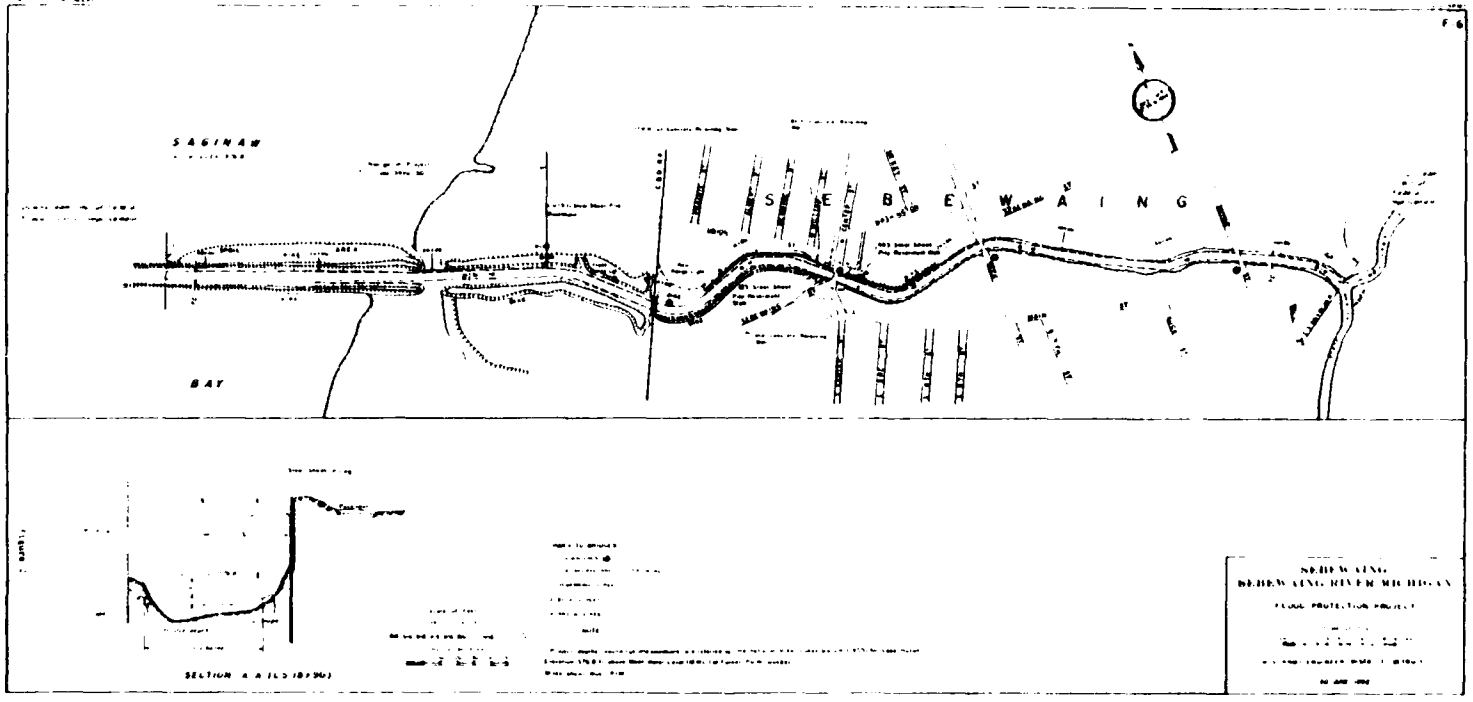
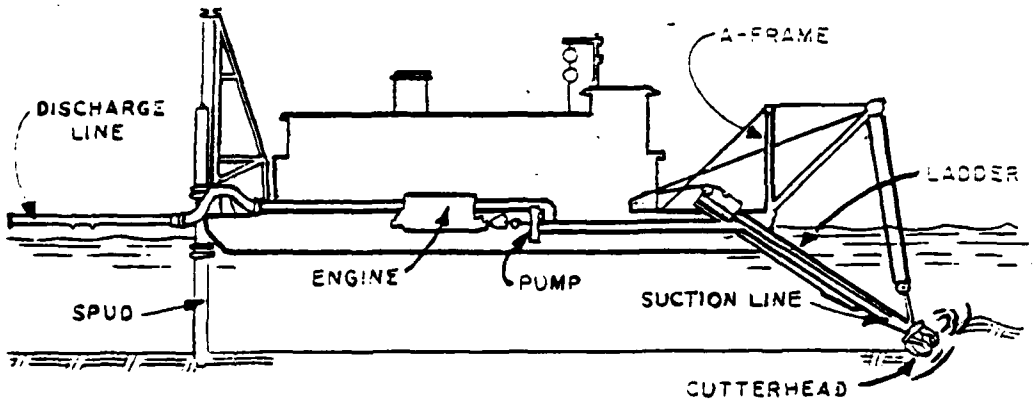
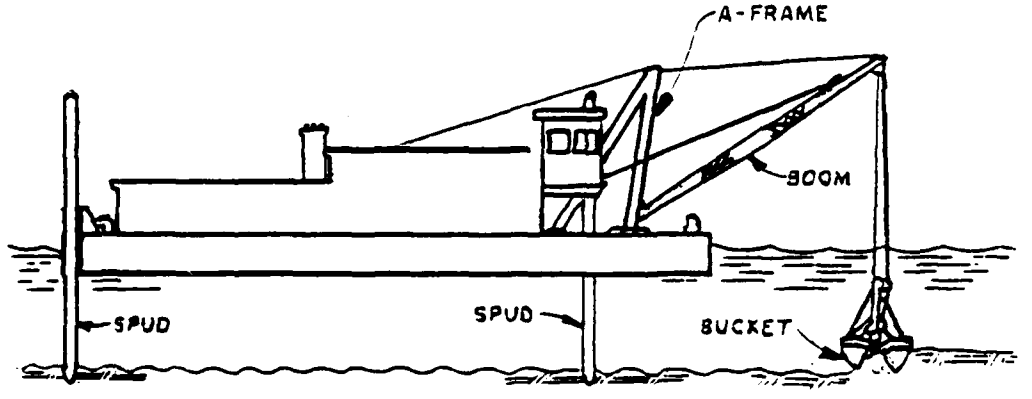

S A G I N A W
B A Y


SAGINAW
BAY
SECTION A-A (1:5 (0:30))



Hydraulic Pipeline-Cutterhead Dredge



Mechanical Bucket Dredge

Figure 3

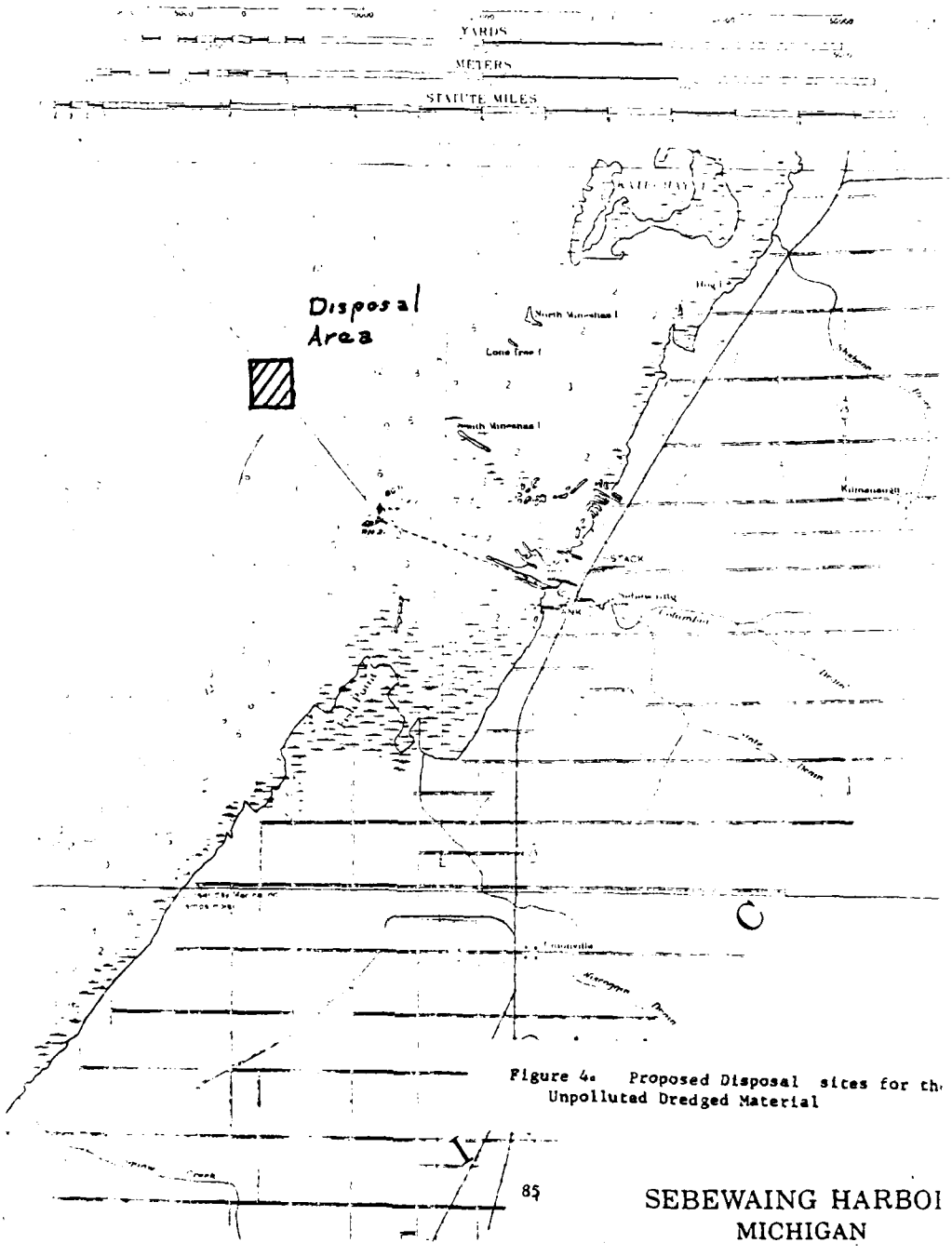


Figure 4. Proposed Disposal sites for th
Unpolluted Dredged Material

SEBEWAING HARBOI
MICHIGAN

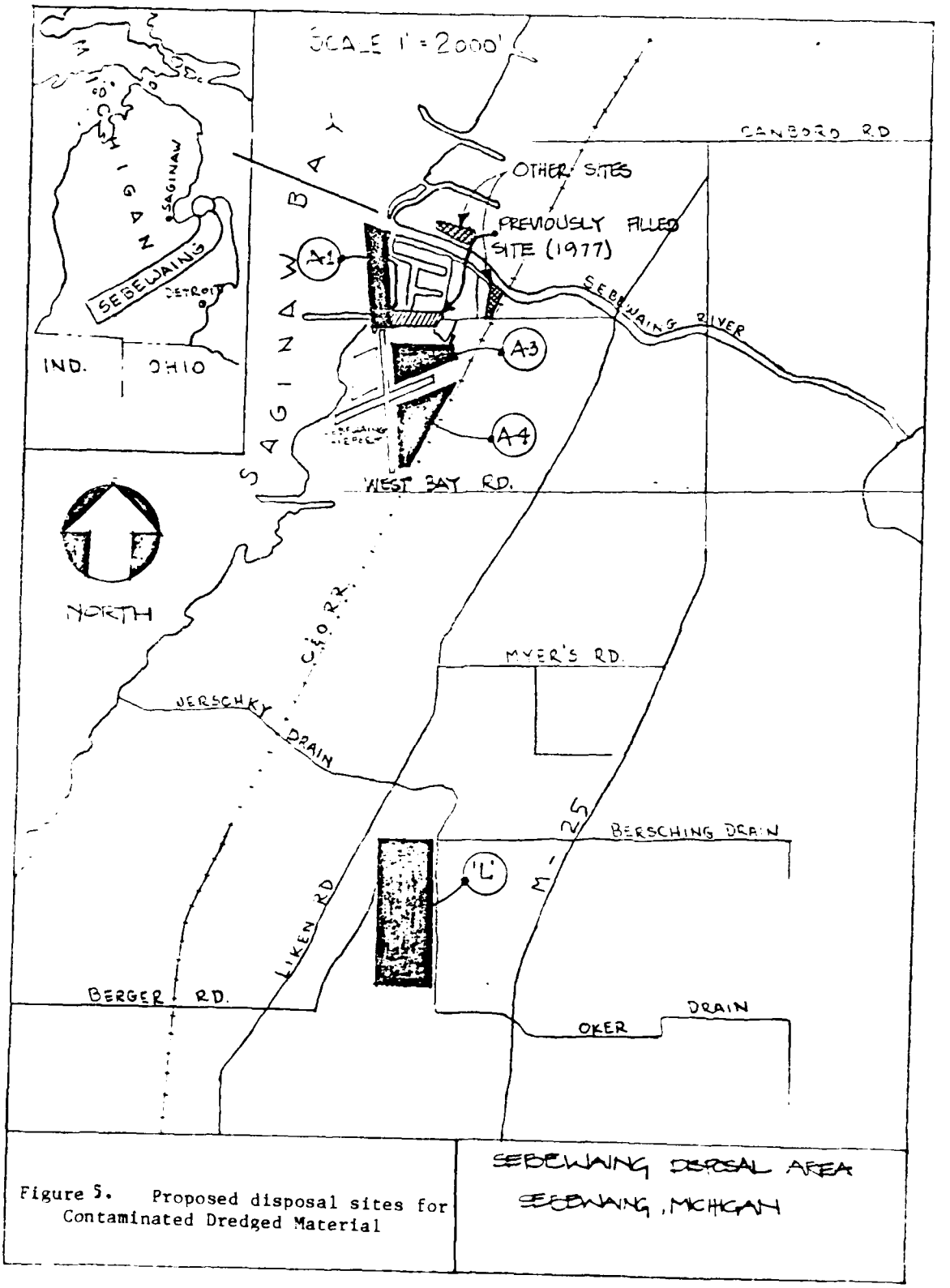


Figure 5. Proposed disposal sites for Contaminated Dredged Material

WATER QUALITY MONITORING STATIONS

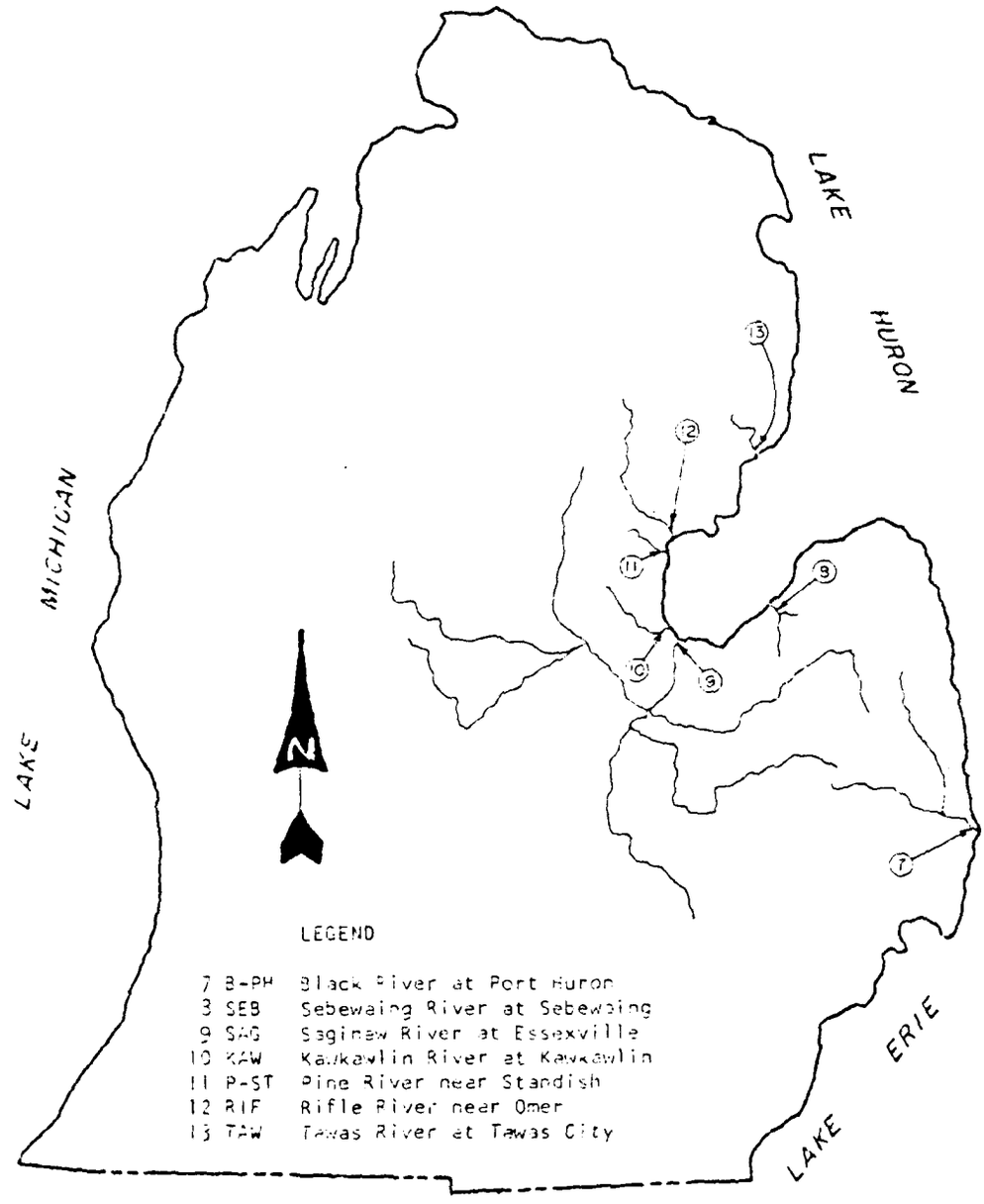
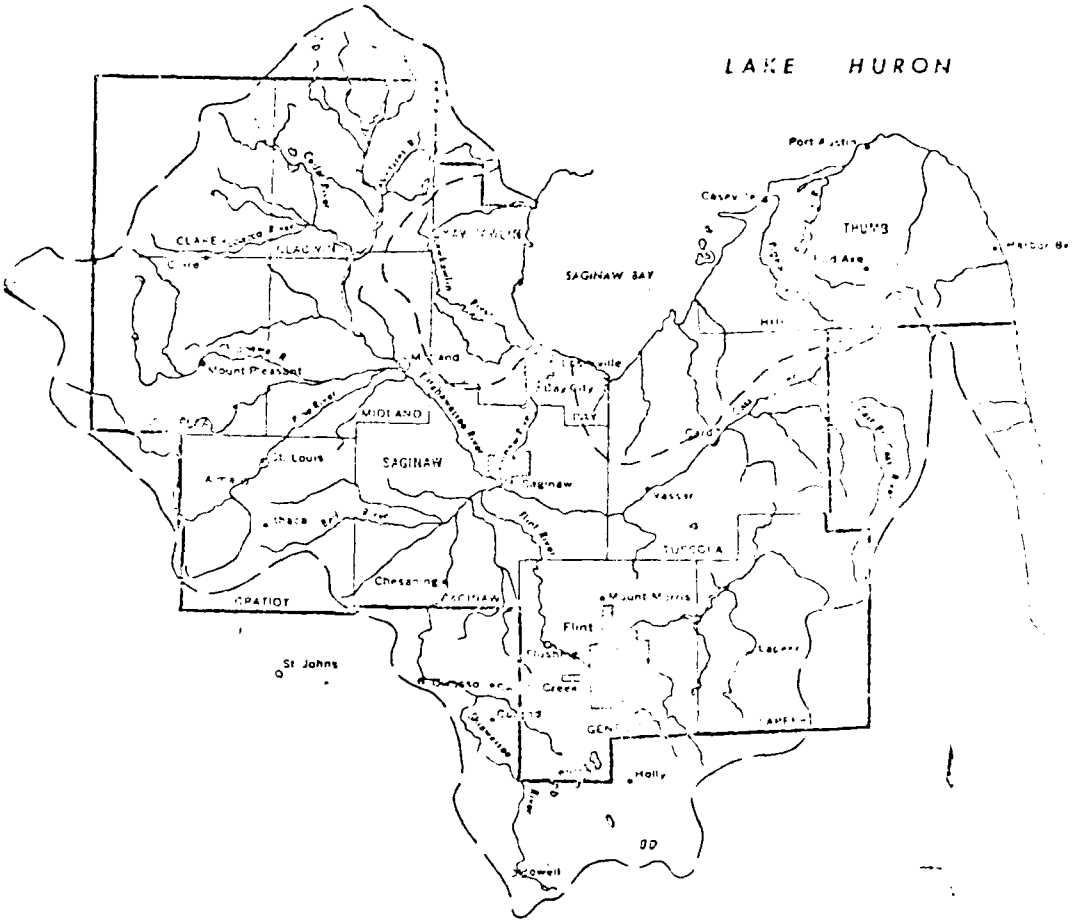
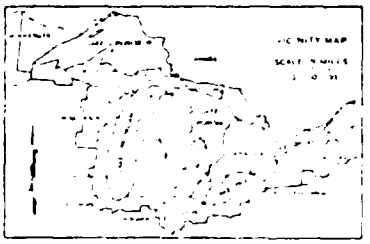


Figure 6.

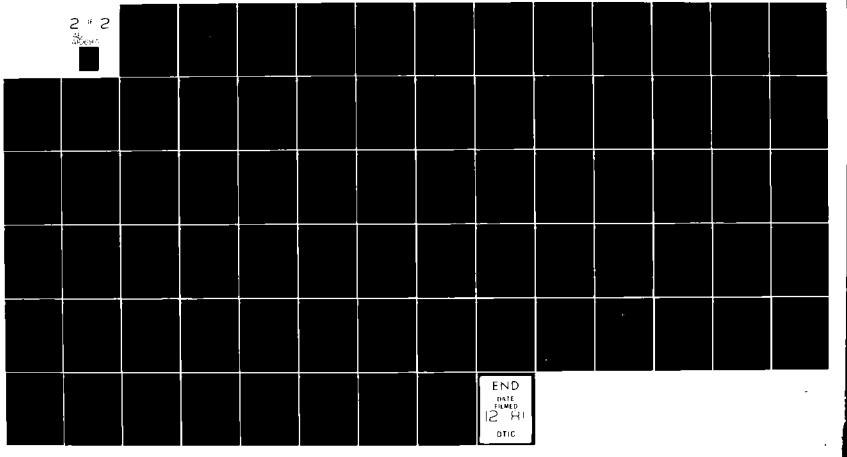




Planning Subarea 12—Lake Huron

AD-A106 971 CORPS OF ENGINEERS DETROIT MI DETROIT DISTRICT F/G 13/2
FINAL ENVIRONMENTAL STATEMENT. SEBEWAING RIVER, MICHIGAN. OPERA--ETC(U)
APR 78

UNCLASSIFIED NL



BOTTOM SEDIMENT SAMPLING STATIONS

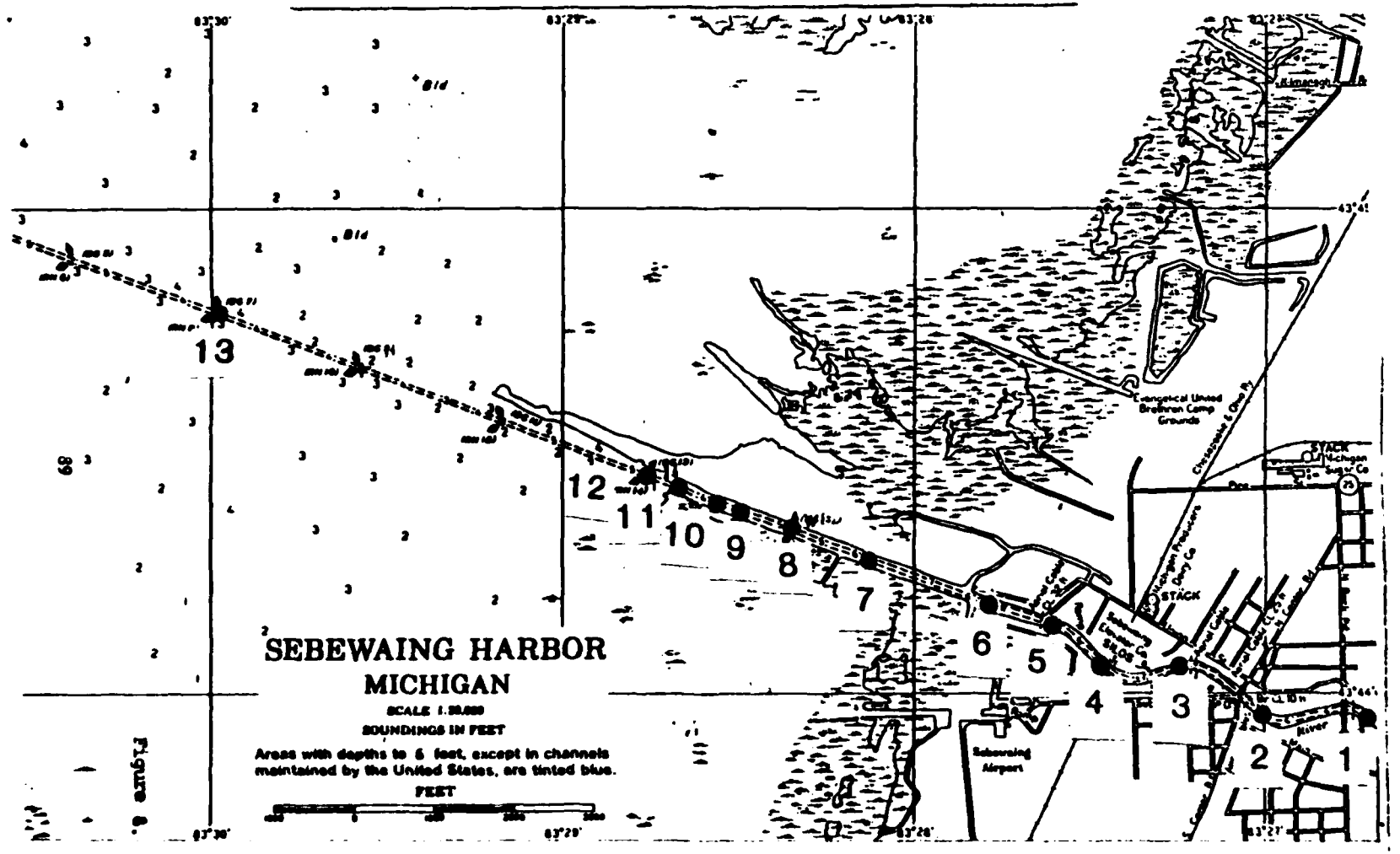


Figure 6.

BIOLOGY SAMPLING STATIONS

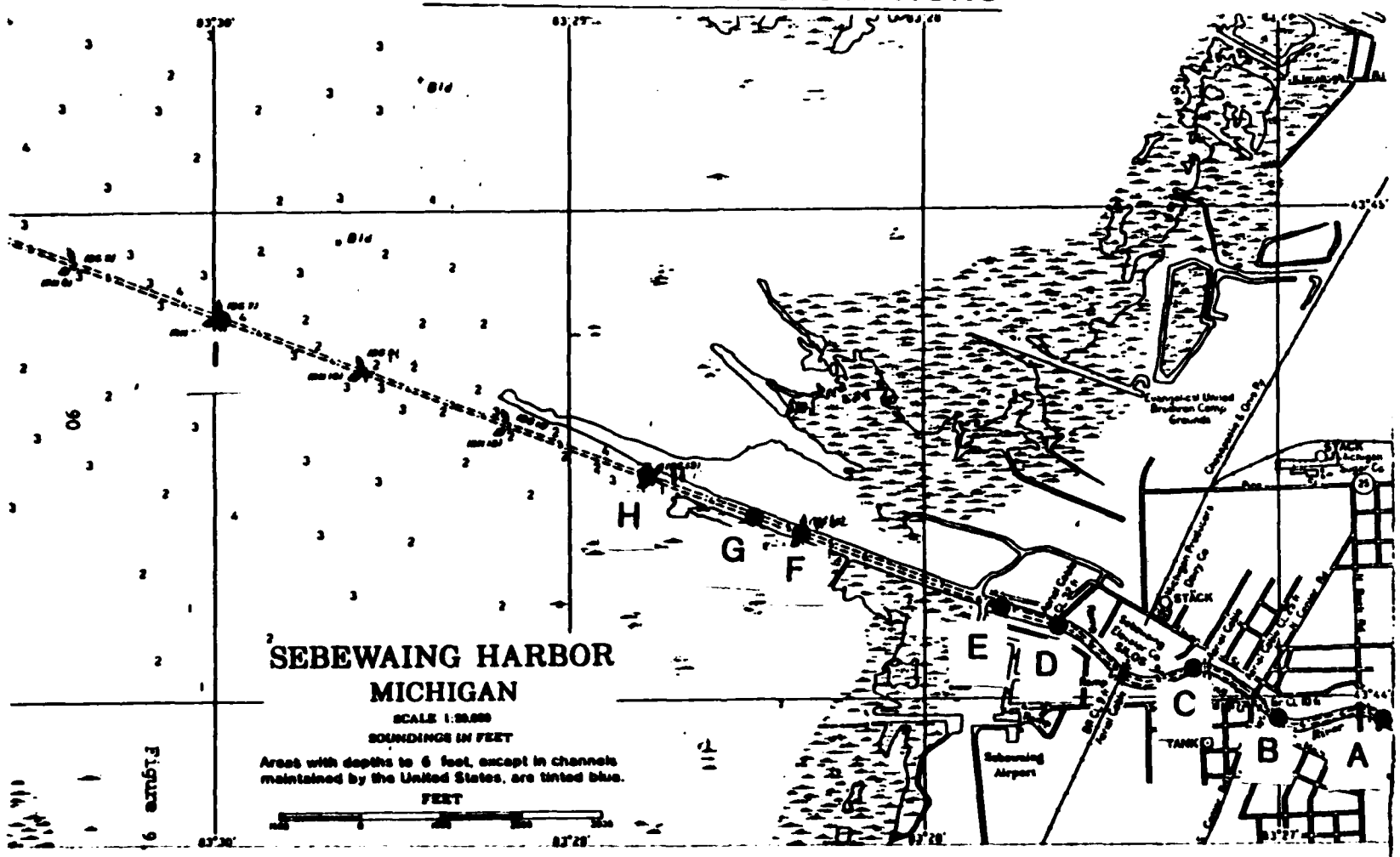


Figure 9

APPENDIX A

Water Quality Data

Sebewaing River, Michigan
Maintenance and
Flood Control Operations
and Confined Disposal

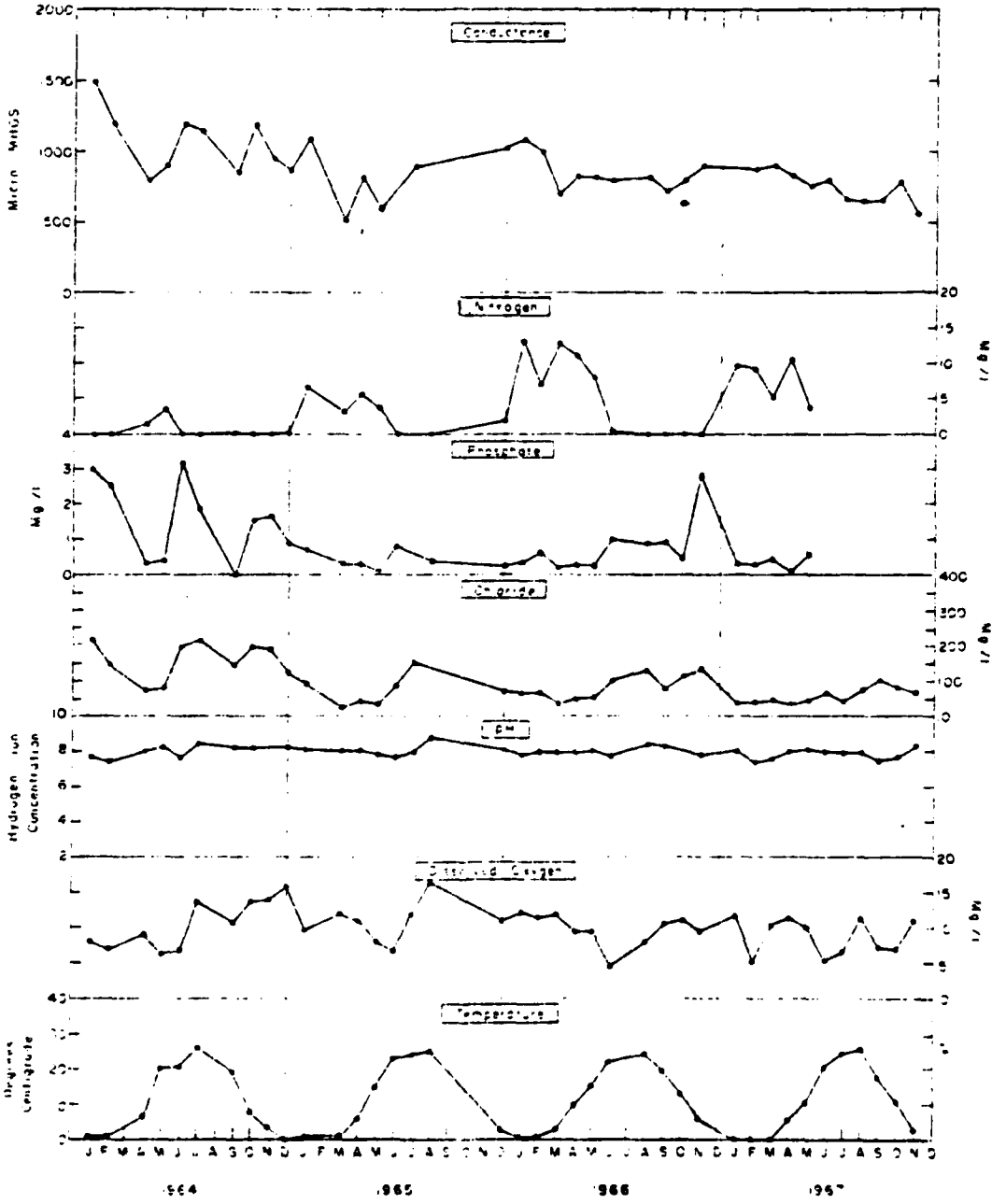
APPENDIX A

Michigan Department of Natural Resources (1)
Sebewaing River Monitoring Station
1965, 1966, 1967

Station No.			Parameter												
			Temp °C	DO mg/l	BOD mg/l	COD mg/l	Susp. Solids mg/l	pH	Cond. micro MHOS	Nitrate Nit. mg/l	Chloride mg/l	Phosphate mg/l	Ammonia Nit. mg/l	Total Coliform mpn/100ml	Fecal Coliform org/100ml
8 SEB	1965	Min	-2	2.6	2.0	15	7	7.3	520	.07	25	.1	0	2,300	-
		Max	25	16.6	16.6	43	208	8.8	1300	1.08	154	.8	1.32	43,000	-
		Med	6	11.1	3.5	29	33	8.1	890	.71	62	.4	.16	15,000	-
	1966	Min	0	4.4	3.2	12	10	7.7	700	0	34	.1	0	360	-
		Max	24	12.6	11.6	43	190	8.4	1180	18.0	132	2.8	2.0	93,000	
		Med	13	11.2	8.2	18	25	7.9	820	6.4	63	.3	.2	1,500	-
	1967	Min	0	3.4	0	-	9.5	7.3	555	.05	26	.1	0	<100	<100
		Max	27	9.8	8.7	-	24	8.3	900	17.5	111	2.14	1.8	170,000	5,900
		Med	9	12.3	3.2	-	40.5	8.0	760	4.6	51	.70	0	14,000	1,800

SEBEWAING RIVER (1)

SUMMARY OF SELECTED WATER QUALITY MONITORING DATA



Sampling location; Chesapeake and Ohio Railroad bridge downstream from Liken Street bridge in Sebewaing

STORET DATE 76/06/28

320024
43 44 03.0 083 27 27.0 2
SEBEWAING R NEAR THE MOUTH
26063 HURON COUNTY
CITY OF SEBEWAING 210391
SEBEWAING BASIN; USES;A2B2C2D
21MICH 02111204
0000 CLASS 00

INDEX 0033550
MILES 0000.36

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER	TEMP	CENT		177	11.4102	83.4482	9.13500	.800602	.686629	28.0000	.000000	63/03/11	75/06/24
00032 CLOUD	COVER	PERCENT		19	66.8421	1714.48	41.4062	.619463	9.49928	100.000	.000000	71/06/03	73/10/12
00035 WIND	VELOCITY	MPH		15	10.6667	66.2381	8.26064	.774435	2.13289	35.0000	3.00000	71/06/03	73/01/17
00036 WIND	DIR.FROM	NORTH=0		15	237.667	5685.24	74.0624	.311623	19.1228	315.000	.000000	71/06/03	73/01/17
00060 STREAM	FLOW	CFS		168	63.9797	7835.35	88.5175	1.38352	6.82928	938.000	.600000	63/03/11	75/06/24
00061 STREAM	FLOW,	INST-CFS		3	134.667	22642.3	150.474	1.11738	86.8760	301.000	8.00000	75/02/20	75/04/24
00070 TURB	JKSN	JTU		58	16.6121	343.834	18.5428	1.11622	2.43478	120.000	2.00000	69/01/23	74/05/24
00076 TURB	TRBIDMTR	HACH FTU		16	31.1375	5571.96	74.6455	2.39729	18.6614	310.000	3.30000	74/06/21	75/06/24
00095 CNDUCTVY	AT 25C	MICROMHO		145	802.883	51556.3	227.060	.282806	18.8563	1700.00	320.000	63/03/11	75/06/24
00300 DO		MG/L		173	9.99587	11.5946	3.40509	.340649	.258884	24.8000	.800000	63/03/11	75/06/24
00310 BOD	5 DAY	MG/L		152	6.35979	40.6393	6.37489	1.00237	.517072	47.8000	.000000	63/03/11	75/06/24
00335 COD	LOWLEVEL	MG/L		61	35.5410	470.287	21.6861	.610172	2.77662	110.000	11.0000	63/03/11	75/06/24
00340 COD	HI LEVEL	MG/L		1	31.0000					31.0000	31.0000	74/04/11	74/04/11
00341 DISS COD	MG/L			1	22.0000					22.0000	22.0000	73/08/22	73/08/22
00400 PH		SU		164	7.94931	.091905	.303158	.038136	.023673	9.20000	7.30000	63/03/11	75/06/24
00403 LAB	PH	SU		9	7.92222	.017029	.130494	.016472	.043498	8.20000	7.80000	73/10/12	74/04/25
00410 T ALK	CACO3	MG/L		72	185.056	2625.90	51.2435	.276909	6.03911	300.000	92.0000	68/04/24	75/06/24
00430 CO3 ALK	CACO3	MG/L		18	.000000	.000000	.000000		.000000	.000000	.000000	71/06/03	73/08/22
00440 HCO3 ION	HCO3	MG/L		6	205.500	1485.90	38.5474	.187578	15.7369	253.000	149.000	63/03/11	65/07/08
00445 CO3 ION	CO3	MG/L		1	.000000					.000000	.000000	63/03/11	63/03/11
00500 RESIDUE	TOTAL	MG/L		99	493.848	21137.8	145.388	.294399	14.6121	1123.00	179.000	67/06/21	75/06/24
00515 RESIDUE	DISS-105	C MG/L		29	443.896	17999.2	134.161	.302235	24.9131	706.000	157.000	63/03/11	69/07/01
00530 RESIDUE	TOT NFLT	MG/L		150	39.2467	5919.03	76.9352	1.96030	6.28174	674.000	.000000	63/03/11	75/06/24
00535 RESIDUE	VOL NFLT	MG/L		119	13.7731	154.465	12.4284	.902367	1.13931	94.0000	.000000	63/03/11	75/06/24
00552 OIL-GRSE	TOT-HEXN	MG/L		2	2.00000	.000000	.000000		.000000	2.00000	2.00000	73/08/22	73/12/17
00556 OIL-GRSE	FREON-GR	MG/L		4	2.60000	1.44000	1.20000	.461539	.600000	4.40000	2.00000	74/04/11	75/04/11
00605 ORG N	N	MG/L		63	.602852	.340539	.583558	.726855	.073521	3.40000	.000000	68/04/24	75/06/24
00610 NH3-N	TOTAL	MG/L		157	.493816	.556538	.746015	1.51071	.059538	4.93000	.000000	63/03/11	75/06/24
00620 NO3-N	TOTAL	MG/L		120	3.89129	30.9879	5.56668	1.43055	.508166	43.0000	.000000	63/03/11	72/08/29
00630 NO2&NO3	N-TOTAL	MG/L		37	4.79985	17.8426	4.22405	.880111	.694430	15.0000	.010000	72/09/18	75/06/24
00665 PHOS-TOT		MG/L P		91	.184175	.022020	.148391	.805707	.015556	1.10000	.040000	68/04/01	75/06/24
00680 T ORG C	C	MG/L		11	25.1273	138.139	11.7533	.467750	3.54374	51.0000	10.0000	73/12/17	75/06/24
00720 CYANIDE	CN-TOT	MG/L		10	.009000	.000032	.005676	.630720	.001795	.020000	.000000	69/09/10	75/04/11
00900 TOT HARD	CACO3	MG/L		78	323.077	9770.85	98.8476	.305957	11.1923	530.000	104.000	63/03/11	75/06/24
00915 CALCIUM	CA,DISS	MG/L		22	78.4409	1024.85	32.0007	.407960	6.82258	138.000	1.00000	63/03/11	72/07/19
00916 CALCIUM	CA-TOT	MG/L		7	68.5714	362.289	23.7126	.367231	8.96253	110.000	46.0000	73/07/20	75/04/11
00925 MGNSIUM	MG,DISS	MG/L		18	23.6667	51.7654	7.19482	.304006	1.69583	42.0000	11.0000	63/03/11	72/07/19
00927 MGNSIUM	MG,TOT	MG/L		7	23.8571	58.4768	7.38088	.309377	2.78970	36.0000	16.0000	73/07/20	75/04/11
00929 SODIUM	NA,TOT	MG/L		7	22.1428	71.8095	8.47406	.382708	3.20289	30.0000	10.0000	73/07/20	75/04/11

STORET DATE 76/06/28

320024
43 44 03.0 083 27 27.0 2
SEBEWAING N NEAR THE MOUTH
26063 HURON COUNTY
CITY OF SEBEWAING 210391
SEBEWAING BASIN; USGS;4282C20
21MICH 02111204
0000 CLASS 00

INDEX 0033550
MILES 0000.36

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00930	SODIUM	NA,DISS	MG/L	21	42.6965	1301.76	36.0799	.845152	7.87329	131.000	5.50000	63/03/11	72/07/19
00935	POTASIUM	K,DISS	MG/L	15	3.58000	2.34178	1.53027	.427451	.395115	6.20000	1.90000	63/03/11	72/07/19
00937	POTASIUM	K,TOT	MG/L	7	2.34286	.179932	.423713	.180853	.160148	3.20000	2.00000	73/07/20	75/04/11
00940	CHLORIDE	CL	MG/L	168	77.4226	3520.28	59.3316	.766334	4.57753	410.000	16.0000	63/03/11	75/06/24
00946	SULFATE	SO4-DISS	MG/L	24	90.1250	1617.77	40.2215	.446285	8.21017	190.000	37.0000	63/03/11	75/04/11
00950	FLUORIDE	F,DISS	MG/L	10	.280000	.008111	.090063	.375263	.028480	.350000	.090000	69/07/01	75/04/11
00955	SILICA	DISOLVED	MG/L	60	3.78499	5.63063	2.37290	.633618	.306339	10.0000	.500000	70/06/30	75/06/24
01000	ARSENIC	AS,DISS	UG/L	7	1.00000	.333333	.577350	.577350	.218218	2.00000	.000000	71/06/03	75/04/11
01005	BARIUM	BA,DISS	UG/L	5	89.4000	19019.8	137.909	1.54247	61.6758	330.000	.040000	73/12/17	75/04/11
01025	CADMIUM	CD,DISS	UG/L	9	1.22222	.694447	.833335	.681820	.277778	2.00000	.000000	69/09/18	75/04/11
01032	CHROMIUM	HEX-VAL	UG/L	10	8.00000	17.7778	4.21637	.527046	1.33333	10.0000	.000000	69/09/18	75/04/11
01040	COPPER	CU,DISS	UG/L	9	3.33333	8.75001	2.39792	.719375	.799306	7.00000	.000000	69/09/18	75/04/11
01045	IRON	FE,TOT	UG/L	34	1040.75	.119E+08	3452.65	3.31746	575.442	21000.0	.000000	63/03/11	75/06/24
01046	IRON	FE,DISS	UG/L	9	13.0000	71.2500	8.44097	.649305	2.81368	27.0000	.000000	71/06/03	75/04/11
01049	LEAD	PB,DISS	UG/L	8	6.75000	54.2143	7.36303	1.09082	2.60322	24.0000	.000000	71/06/03	75/04/11
01055	MANGANESE	MN	UG/L	4	80.0000	66.6667	8.16497	.204124	4.08248	90.0000	30.0000	73/07/23	73/10/12
01056	MANGANESE	MN,DISS	UG/L	28	10.0571	151.238	12.2979	1.13270	2.32408	80.0000	.000000	71/06/03	75/06/24
01065	NICKEL	NI,DISS	UG/L	9	5.33333	15.7500	3.96863	.744118	1.32288	11.0000	.000000	69/09/18	75/04/11
01075	SILVER	AG,DISS	UG/L	6	2.66667	4.26667	2.06559	.774597	.843274	5.00000	.000000	71/06/03	75/04/11
01080	STRONTIUM	SR,DISS	UG/L	5	197.662	30930.7	175.871	.889758	78.6520	420.000	.310000	73/12/17	75/04/11
01090	ZINC	ZN,DISS	UG/L	10	12.2000	183.289	13.5384	1.10971	4.28123	40.0000	.000000	69/09/18	75/04/11
01145	SELENIUM	SE,DISS	UG/L	7	1.00000	.000000	.000000		.000000	1.00000	1.00000	72/08/29	75/04/11
03501	BETA	TOTAL	PC/L	6	6.41667	4.24169	2.05954	.320967	.840802	9.00000	4.00000	73/08/22	75/04/11
03502	BETA-T	ERROR	PC/L	6	2.13333	.186667	.432050	.202523	.176383	3.00000	1.00000	73/08/22	75/04/11
07000	H-3	TOTAL	PC/L	5	280.000	7000.00	83.6660	.298807	37.4166	400.000	200.000	73/08/22	75/04/11
07001	H-3,TOTL	ERROR	PC/L	5	200.000	.000000	.000000		.000000	200.000	200.000	73/08/22	75/04/11
09503	RA-226	DISOLVED	PC/L	5	.884000	.488680	.699057	.790789	.312628	1.60000	.140000	73/12/17	75/04/11
09504	RA-226-D	ERROR	PC/L	5	.112000	.006770	.082280	.734643	.036797	.200000	.030000	73/12/17	75/04/11
11501	RA-228	TOTAL	PC/L	5	.005438	.000078	.008818	1.62157	.003944	.021000	.000290	73/12/17	75/04/11
11502	RA-228	ERROR	PC/L	5	.002260	.000010	.003223	1.42612	.001441	.008000	.000300	73/12/17	75/04/11
20501	RA-223	TOTAL	PC/L	5	.036860	.000855	.029247	.793468	.013080	.069000	.005800	73/12/17	75/04/11
20502	RA-223	ERROR	PC/L	5	.005500	.000017	.004123	.749656	.001844	.010000	.002000	73/12/17	75/04/11
20501	RA-228	TOTAL	PC/L	5	.005438	.000078	.008818	1.62157	.003944	.021000	.000290	73/12/17	75/04/11
20502	RA-224	ERROR	PC/L	5	.002260	.000010	.003223	1.42612	.001441	.008000	.000300	73/12/17	75/04/11
31504	TOT COLI	MPN LES	/100ML	111	14884.7	.743E+09	27264.8	1.61477	2587.86	200000	100.000	67/01/04	75/06/24
31505	TOT COLI	MPN CONF	/100ML	38	50212.3	.363E+11	190592	3.27409	32686.3	1100000	30.0000	63/04/17	66/11/08
31616	FEC COLI	MPN-FCBR	/100ML	107	1104.39	3396900	1843.07	1.66885	178.176	12000.0	10.0000	67/01/04	75/06/24
32209	CHLRPHYL	A	UG/L	15	15.0000	212.087	14.5632	.965731	3.76021	43.3400	.550000	74/06/21	75/05/22
32211	CHLRPHYL	A UG/L	CORRECTD	4	10.1000	103.771	10.1868	1.00860	5.09341	21.9000	.000000	74/04/11	74/05/24
32730	PHENOLS	TOTAL	UG/L	32	8.37500	1223.68	34.9811	4.17685	6.18384	200.000	.000000	71/06/03	75/06/24

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26063 HURON COUNTY
CITY OF SEBEWAING 210391
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PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
39100 DEMP	WHL SMPL	UG/L		3	.170666	.005634	.213621	.567135	.123334	.500000	.130000	74/08/16	75/04/11
39110 DBP	WHL SMPL	UG/L		3	2.00000	.750000	.866025	.433013	.500000	3.00000	1.50000	73/12/17	75/04/11
39300 P,P' DDT	WHL SMPL	UG/L		6	.014000	.000096	.009798	.699856	.004000	.034000	.010000	73/08/22	75/04/11
39305 O,P' DDT	WHL SMPL	UG/L		6	.011000	.000006	.002449	.222682	.001000	.016000	.010000	73/08/22	75/04/11
39330 ALDRIN	WHL SMPL	UG/L		6	.006667	.000007	.002582	.387299	.001054	.010000	.005000	73/08/22	75/04/11
39350 CHLRDANE	WHL SMPL	UG/L		6	.017506	.000118	.010840	.619415	.004425	.030000	.005000	73/08/22	75/04/11
39360 DDD	WHL SMPL	UG/L		6	.007333	.000009	.002944	.401444	.001202	.010000	.004000	73/08/22	75/04/11
39365 DDE	WHL SMPL	UG/L		6	.007333	.000007	.002582	.352090	.001054	.010000	.005000	73/08/22	75/04/11
39380 DIELDRIN	WHL SMPL	UG/L		6	.006008	.000010	.003225	.537482	.001317	.010000	.003000	73/08/22	75/04/11
39390 ENDRIN	WHL SMPL	UG/L		6	.009167	.000004	.002041	.222682	.000833	.010000	.005000	73/08/22	75/04/11
39410 HCHLR	WHL SMPL	UG/L		6	.006667	.000007	.002582	.387299	.001054	.010000	.005000	73/08/22	75/04/11
39420 HCHLR-EP	WHL SMPL	UG/L		4	.006250	.000006	.002500	.400000	.001250	.010000	.005000	74/04/11	75/04/11
39496 AROCLOR 1242		UG/L		3	.040000	.002700	.051961	1.29904	.030000	.100000	.010000	74/04/11	75/04/11
39504 AROCLOR 1254		UG/L		4	.055000	.002700	.051961	.944755	.025981	.100000	.010000	73/12/17	75/04/11
39508 AROCLOR 1260		UG/L		3	.173333	.080033	.282902	1.63212	.163333	.500000	.010000	74/08/16	75/04/11
39516 PCBS	WHL SMPL	UG/L		1	.100000					.100000	.100000	74/08/16	74/08/16
39782 LINDANE	WHL SMPL	UG/L		6	.006667	.000007	.002582	.387299	.001054	.010000	.005000	73/08/22	75/04/11
47004 TOT DISS	SOL-E.C.	MG/L		50	460.940	22840.3	151.130	.328159	21.3730	1100.00	210.000	69/09/18	75/05/22
70300 RESIDUE	DISS-180 C	MG/L		28	501.700	6117.73	78.2159	.155902	17.4896	662.000	354.000	74/01/16	75/06/24
70507 PHOS-T	ORTHO	MG/L P		154	.191618	.106154	.325813	1.70032	.026255	2.82000	.000000	63/04/02	75/06/24
71900 MERCURY	HG,TOTAL	UG/L		9	.177778	.004444	.066667	.375001	.022222	.200000	.000000	71/06/03	75/04/11

APPENDIX B

State of Michigan
Water Quality Standards

Sebewaing River, Michigan
Maintenance and
Flood Control Operations
and Confined Disposal

APPENDIX B

DEPARTMENT OF NATURAL RESOURCES

WATER RESOURCES COMMISSION

GENERAL RULES

Filed with Secretary of State, December 1974.

These rules take effect 15 days after filing with the Secretary of State.

(By authority conferred on the water resources commission by sections 2 and 5 of Act No. 245 of the Public Acts of 1929, as amended, being sections 323.2 and 323.5 of the Michigan Compiled Laws.)

Part 4. Water Quality Standards, is added to the General Rules of the commission to read as follows:

PART 4. WATER QUALITY STANDARDS

R 323.1041. Purpose

Rule 1041. It is the purpose of the water quality standards as prescribed by these rules to establish water quality requirements applicable to the Great Lakes, their connecting waterways and all other surface waters of the state, which shall protect the public health and welfare, enhance and maintain the quality of water, serve the purposes of United States Public Law 92-500 and the commission act; and which shall protect the quality of waters for recreational purposes, public and industrial water supplies, agricultural uses, navigation and propagation of fish, other aquatic life and wildlife.

R 323.1043. Definitions A to N.

Rule 1043. As used in this part:

(a) "Agricultural water use" means a use of water for agricultural purposes, including but not limited to livestock watering, irrigation and crop spraying.

(b) "Application factor" means a numerical factor applied to the TL_m, or concentration producing other effect end points to provide the concentration of a toxic substance that would be safe for test organisms in the waters of the state.

(c) "Best practicable waste treatment technology for control of total phosphorus" means chemical-physical or chemical-physical-biological treatment processes, including but not limited to treatment with aluminum salts, iron salts or lime in conjunction with appropriate coagulant chemicals, settling or filtration or both, with operation and management of the treatment facilities and the process to achieve optimum phosphorus removal rates, or equivalent treatment.

(d) "Anadromous salmonids" means those trout and salmon which ascend streams to spawn.

(e) "Coldwater fish" means those fish species whose populations thrive in relatively cold water, including but not limited to trout, salmon, whitefish and cisco.

(f) "Connecting waterways" means the St. Marys River, Keweenaw waterway, Detroit River, St. Clair River and Lake St. Clair.

(g) "Designated use" means a use of the waters of the state as established by these rules, including but not limited to industrial, agricultural and public water supply; recreation; fish, other aquatic life and wildlife; and navigation.

(h) "Dissolved oxygen" means the amount of oxygen dissolved in water, commonly expressed as a concentration in terms of milligrams per liter.

(i) "Dissolved solids" means the amount of materials dissolved in water commonly expressed as a concentration in terms of milligrams per liter.

(j) "Effluent" means a wastewater discharged from a point source to the waters of the state.

(k) "Fecal coliform" means a type of coliform bacteria found in the intestinal tract of humans and other warm-blooded animals.

(l) "Fish, other aquatic life and wildlife use" means the use of the waters of the state by fish, other aquatic life and wildlife for any life history stage or activity.

(m) "Industrial water supply" means a water source not protected for public water supply and intended for use in commercial or industrial applications and non-contact food processing.

(n) "Mixing zone" means a region of a water body which receives a wastewater discharge of a different quality than the receiving waters, and within which the water quality standards as prescribed by these rules do not apply.

(o) "Natural water temperature" means the temperature of a body of water without an influence from an artificial source, or a temperature as otherwise determined by the commission.

R 323.1044. Definitions P to W.

Rule 1044. As used in this part:

(a) "Palatability" means the state of being aggreeable or acceptable to the senses of sight, taste or smell.

(b) "Plant nutrients" means those chemicals, including but not limited to nitrogen and phosphorus, necessary for the growth and reproduction of aquatic rooted, attached and floating plants, fungi or bacteria.

(c) "Point source" means a discernible, confined and discrete conveyance, from which wastewater is or may be discharged to the waters of the state including but not limited to a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation or vessel or other floating craft.

(d) "Public water supply" means a surface raw water source which, after conventional treatment, will provide a safe, clear, potable and aesthetically pleasing water for uses which include but are not limited to human consumption, food processing and cooking and as a liquid ingredient in foods and beverages.

(e) "Raw water" means the waters of the state prior to any treatment.

(f) "Receiving waters" means the waters of the state into which an effluent is or may be discharged.

(g) "Sanitary sewage" means treated or untreated wastewaters which contain human metabolic and domestic wastes.

(h) "Standard" means a definite numerical value or narrative statement promulgated by the commission to enhance or maintain water quality to provide for and fully protect a designated use of the waters of the state.

(i) "Suspended solids" means the amount of material suspended in water, commonly expressed as a concentration in terms of milligrams per liter.

(j) "TL_m" means median tolerance limit which is the concentration of a test material in a suitable diluent at which 50% of the exposed organisms survive for a specified period of exposure.

(k) "Total body contact recreation" means an activity where the human body may come into direct contact with water to the point of complete submergence, including but not limited to activities such as swimming, water skiing and skin diving.

(l) "Toxic substance" means a substance of unnatural origin, except heat, in concentrations or combinations which are or may become harmful to plant or animal life.

(m) "Warmwater fish" means those fish species whose populations thrive in relatively warm water, including but not limited to bass, pike, walleye and panfish.

(n) "Wastewater" means liquid waste resulting from commercial, municipal and domestic operations and industrial processes, including but not limited to cooling and condensing waters, sanitary sewage and industrial waste.

(o) "Waters of the state" means the Great Lakes, their connecting waterways, all inland lakes, rivers, streams, impoundments, open drains and other surface watercourses within the confines of the state, except drainage ways and ponds used solely for wastewater conveyance, treatment or control.

R 323.1050. Suspended solids.

Rule 1050. All waters of the state shall contain no unnatural turbidity, color, oil films, floating solids, foams, settleable solids or deposits in quantities which are or may become injurious to any designated use.

R 323.1051. Dissolved solids.

Rule 1051. (1) The addition of any dissolved solids shall not exceed concentrations which are or may become injurious to any designated use. Point sources containing dissolved solids shall be considered by the commission on a case-by-case basis and increases of dissolved solids in the waters of the

state shall be limited through the application of best practicable control technology currently available as prescribed by the administrator of the United States environmental protection agency pursuant to Section 304 (b) of United States Public Law 92-500, except that in no instance shall total dissolved solids in the waters of the state exceed a concentration of 500 milligrams per liter as a monthly average nor more than 750 milligrams per liter at any time, as a result of controllable point sources.

(2) In addition to the standards prescribed by subrule (1), waters of the state used for public water supply shall, at the point of water intake, not exceed the permissible inorganic and organic chemicals criteria for raw public water supply in "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968," except chlorides. For the Great Lakes and connecting waters, chlorides shall, at the point of water intake, not exceed 50 milligrams per liter as a monthly average. For all other waters of the state, chlorides shall, at the point of water intake, not exceed 125 milligrams per liter as a monthly average.

R 323.1053. Hydrogen ion concentration.

Rule 1053. The hydrogen ion concentration expressed as pH shall be maintained within the range of 6.5 to 8.8 in all waters of the state except as otherwise prescribed by rule 1080. Any artificially induced variation in the natural pH shall remain within this range and shall not exceed 0.5 units of pH.

R 323.1055. Taste and odor producing substances.

Rule 1055. The waters of the state shall contain no unnatural substances in concentrations which are or may become injurious to their use for public, industrial or agricultural water supply, or in concentrations which lower the palatability of fish as measured by test procedures acceptable to the commission.

R 323.1057. Toxic substances.

Rule 1057. (1) Toxicity of undefined toxic substances not specifically included in subrules (2) and (3) shall be determined by development of 96 hour TL_m's or other appropriate effect end points obtained by continuous-flow or in situ bioassays using suitable test organisms. Concentrations of undefined toxic substances in the waters of the state shall not exceed safe concentrations as determined by applying an application factor, based on knowledge of the behavior of the toxic substances and the organisms to be protected in the environment, to the TL_m or other appropriate effect end point.

(2) For all waters of the state, unless on the basis of recent information a more restrictive limitation is required to protect a designated use, concentrations of defined toxic substances, including heavy metals, shall be limited by application of the toxic substances recommendations contained in the chapter on Freshwater Organisms, "Report on the National

Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968," or by application of any toxic effluent standard, limitation or prohibition promulgated by the administrator of the United States environmental protection agency pursuant to section 307 (a) of the United States Public Law 92-500, whichever is more restrictive.

(3) In addition to the standards prescribed in subrules (1) and (2), waters of the state used for public water supply shall, at the point of water intake, not exceed the permissible inorganic and organic chemicals criteria for raw public water supply in "Report of the National Technical Advisory Committee to the Secretary of the Interior, Water Quality Criteria, 1968," except that chlorides shall be limited to the same extent as prescribed by rule 1051(2).

R 323.1058. Radioactive substances.

Rule 1058. The control and regulation of radioactive substances discharged to the waters of the state shall be in accordance with and subject to the criteria, standards or requirements prescribed by the United States atomic energy commission as set forth in the applicable Code of Federal Regulations, Title 10, Part 20.

R 323.1069. Plant nutrients.

Rule 1060. Nutrients originating from domestic, industrial, municipal

or domestic animal sources shall be limited to the extent necessary to prevent stimulation of growths of aquatic rooted, attached and floating plants, fungi or bacteria which are or may become injurious to the designated uses of the waters of the state. Phosphorus which is or may readily become available as a plant nutrient shall be controlled from point source discharges by the application of methods utilizing best practicable waste treatment technology for control of total phosphorus, with the goal of achieving a monthly average effluent concentration of one milligram per liter as P.

R 323.1062. Fecal coliform.

Rule 1062. (1) Waters of the state protected for total body contact recreation shall contain not more than 200 fecal coliforms per 100 milliliters; and all other waters of the state shall contain not more than 1,000 fecal coliforms per 100 milliliters. These concentrations may be exceeded if due to uncontrollable non-point sources.

(2) Compliance with the fecal coliform standards prescribed by subrule (1) shall be determined on the basis of the geometric average of any series of 5 or more consecutive samples taken over not more than a 30-day period.

R 323.1064. Dissolved oxygen; Great Lakes, connecting waterways and inland streams.

Rule 1064. A minimum of 6 milligrams per liter of dissolved oxygen in all Great Lakes and connecting waterways shall be maintained and, except for inland lakes as prescribed in rule 1065, a minimum of 6 milligrams per liter of dissolved oxygen shall be maintained at all times in all inland streams designated by these rules to be protected for coldwater fish. In all other waters, except for inland lakes as prescribed by rule 1065, a minimum of 5 milligrams per liter of dissolved oxygen shall be maintained as a daily average and no single value shall be less than 4 milligrams per liter in waters naturally capable of supporting warm water fish.

R 323.1069. Temperature; general considerations.

Rule 1069. (1) In all waters of the state, the points of temperature measurement normally shall be in the surface 1 meter; however, where turbulance, sinking plumes, discharge inertia or other phenomena upset the natural thermal distribution patterns of receiving waters, temperature measurements ahll be required to identify the spatial characteristics of the thermal profile.

(2) Monthly maximum temperatures, based on the ninetieth percentile occurrence of natural water temperatures plus the increase allowed at the edge of the mixing zone and in part on long-term physiological needs of fish, may be exceeded for short periods when natural water temperatures exceed the ninetieth percentile occurrence. Temperature increases during these periods may be permitted by the commission, but in all cases shall not be greater than the natural water temperature plus the increase allowed at the edge of the mixing zone.

(3) Natural daily and seasonal temperature fluctuations of the receiving waters shall be preserved.

R 323.1070. Temperature; Great Lakes and connecting waterways.

Rule 1070. (1) The Great Lakes and connecting waterways shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.

(2) The Great Lakes and connecting waterways shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures in degrees Fahrenheit higher than the following monthly maximum temperatures:

(j) Lake Erie:

J	F	M	A	M	J	J	A	S	O	N	D
45	45	45	60	70	75	80	85	80	70	60	50

R 323.1075. Temperature; rivers and streams.

(2) Rivers and streams naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.

(3) Rivers and streams naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone to temperatures greater than the following monthly maximum temperatures:

(b) Rivers and streams south of a line between Bay City, Midland, Alma and North Muskegon, except the St. Joseph River:

J	F	M	A	M	J	J	A	S	O	N	D
41	40	50	63	76	84	85	85	79	68	55	43

(4) Non-trout rivers and streams that serve as principal migratory routes for anadromous salmonids shall not receive a heat load during periods of migration at such locations and in a manner which may adversely affect salmonid migration or raise the receiving water temperature at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.

$ 323.1080. Special conditions.

Rule 1080. To be consistent with the agreement between the United states of America and Canada on Great Lakes water quality effective April 15, 1972, the following conditions shall apply to the Michigan waters of the Great Lakes and their connecting waterways:

(a) Values of pH shall not be outside the range of 6.7 to 8.5.

(b)In Lake Erie, the level of total dissolved solids shall not be greater than 200 milligrams per liter.

(c) Filtrable inron shall not be greater than 0.3 milligrams per liter.

R 323.1082. Mixing zones.

Rule 1082. (1) A mixing zone to achieve a mixture of a point source discharge with the receiving waters shall be considered a region in which organism response to water quality characteristics is time-

dependent. Exposure in mixing zones shall not cause an irreversible response which results in deleterious effects to populations of important aquatic life and wildlife. As a minimum restriction the toxic substance 96 hour TL_m for important species of fish or fishfood organisms shall not be exceed in the mixing zone at any point inhabitable by these organism,s unless it can be demonstrated to the commission that a higher concentration is acceptable. The mixing zone at any transect of a stream shall contain not more than 25% of the cross-sectional area or volume of flow of the stream or both unless it can be demonstrated to the commission that designation of a greater area or volume of streamflow will allow passage of fish and fishfood organisms so that effects on their immediate and future populations are negligible or not measurable. Watercourses or portions thereof which, without one or more point source discharges, would have no flow except during periods of surface runoff may be considered as a mixing zone for a point source discharge. For Lake Michigan, mixing zones shall not exceed a defined area equivalent to that of a circle radius of 1,000 feet unless the discharger can demonstrate to the commission that the defined area for a thermal discharge is more stringent than necessary to assure the protection and propagation of a balanced indigenous population of aquatic life and wildlife in the receiving water.

(2) All mixing zones established by the commission pursuant to subrule (1) shall be determined on a case-by-case basis.

R 323.1090. Application of water quality standards.

Rule 1090. (1) The water quality standards prescribed by these rules for the various designated uses of the waters of the state apply to receiving waters and are not to be considered applicable to wastewater effluents. The water quality standards shall not apply within defined mixing zones, except for those standards prescribed in rule 1050 for settleable solids, deposits, floating solids and oil films.

(2) The accepted design streamflow to which the water quality standards as prescribed by these rules shall apply are those equal to or exceeding the 10-year recurrance of a minimum low flow average of 7-day duration, except where the commission determines that a more restrictive application is necessary to protect a particular designated use.

R 323.1091. Designated use interruption.

Rule 1091. Protection of the waters of the state designated for total body contact recreation by the water quality standards prescribed by these rules may be subject to temporary interruption during or following flood conditions or uncontrollable accidents to a sewer or wastewater treatment system. In the event of such an occurrence, full public notice thereof shall be served by the commission to those affected thereby and immediate corrective action shall be required by the commission.

R 323.1092. Dredging.

Rule 1092. The water quality standards prescribed by these rules shall not apply to dredging or construction activities within water areas where wuch activities occur or during the periods of time when the after effects of dredging or construction activities degrade water quality within such water areas, if the dredging operations or construction have been authorized by the United States Army Corps of Engineers or the department. The water quality standards shall apply, however, in non-confined water areas utilized for the disposal of spoil from dredging operations, except within spoil disposal sites specifically defined by the United States Army Corps of Engineers or the department.

(2) Waters of the state which do not meet the water quality standards prescribed by these rules shall be improved to meet those standards. Where the water quality of certain waters of the state do not meet the water quality standards as a result of natural causes or conditions, no further reduction of water quality by controllable point and non-point sources shall be permitted.

R 323.1100. Designated uses, general.

Rule 1100. (1) As a minimum, all waters of the state shall be protected for agricultural uses, navigation, industrial water supply, public water supply at the point of water intake, warmwater fish and partial body contact recreation.

R 323.1105. Multiple designated uses.

Rule 1105. When a particular portion of the waters of the state is designated for more than 1 use, the most restrictive water quality standards for one or more of those designated uses shall apply to that portion.

R 323.1110. Designated uses, total body contact recreation.

Rule 1110. (1) The following waters of the state, except in mixing zones prescribed by the commission, shall be protected for total body contact recreation:

(a) All Great Lakes and their connecting waterways.

GUIDELINES FOR THE POLLUTIONAL CLASSIFICATION OF GREAT LAKES HARBOR SEDIMENTS

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION V

CHICAGO, ILLINOIS

April, 1977

Guidelines for the evaluation of Great Lakes harbor sediments, based on bulk sediment analysis, have been developed by Region V of the U.S. Environmental Protection Agency. These guidelines, developed under the pressure of the need to make immediate decisions regarding the disposal of dredged material, have not been adequately related to the impact of the sediments on the lakes and are considered interim guidelines until more scientifically sound guidelines are developed.

The guidelines are based on the following facts and assumptions:

1. Sediments that have been severely altered by the activities of man are most likely to have adverse environmental impacts.

2. The variability of the sampling and analytical techniques is such that the assessment of any sample must be based on all factors and not on any single parameter with the exception of mercury and polychlorinated biphenyls (PCB's).

3. Due to the documented bioaccumulation of mercury and PBC's, rigid limitations are used which override all other considerations.

Sediments are classified as heavily polluted, moderately polluted, or nonpolluted by evaluating each parameter measured against the scales shown below. The overall classification of the sample is based on the most predominant classification of the individual parameters. Additional factors such as elutriate test results, source of contamination particle size distribution, benthic macroinvertebrate populations, color, and odor are also considered. These factors are interrelated in a complex manner and their interpretation is necessarily showewhat subjective.

The following ranges used to classify sediments from Great Lakes harbors are based on compilations of data from over 100 different harbors since 1967.

	NONPOLLUTED	MODERATELY POLLUTED	HEAVILY POLLUTED
Volatile Solids (%)	<5	5 - 8	>8
COD (mg/kg dry weight)	<40,000	40,000-80,000	>80,000
TKN " " "	<1,000	1,000-2,000	>2,000
Oil and Grease (Hexane Solubles) (mg/kg dry weight)	<1,000	1,000-2,000	>2,000
Lead (mg/kg dry weight)	<40	40-60	>60
Zinc " " "	<90	90-200	>200

The following supplementary ranges used to classify sediments from Great Lakes harbors have been developed to the point where they are usable but are still subject to modification by the addition of new data. These ranges are based on 260 samples from 34 harbors sampled during 1974 and 1975.

	NONPOLLUTED	MODERATELY POLLUTED	HEAVILY POLLUTED
Ammonia (mg/kg dry weight)	<75	75-200	>200
Cyanide " " "	<0.10	0.10-0.25	>0.25
Phosphorus " " "	<420	420-650	>650
Iron " " "	<17,000	17,000-25,000	>25,000
Nickel " " "	<20	20-50	>50
Manganese " " "	<300	300-500	>500
Arsenic " " "	<3	3-8	>8
Cadmium " " "	*	*	>6
Chromium " " "	<25	25-75	>75
Barium " " "	<20	20-60	>60
Copper " " "	<25	25-50	>50

*Lower limits not established

The guidelines stated below for mercury and PCB's are based upon the best available information and are subject to revision as new information becomes available.

Methylation of mercury at levels $\geq$ mg/kg has been documented (1,2). Methyl mercury is directly available for bioaccumulation in the food chain.

Elevated PCB levels in large fish have been found in all of the Great Lakes. The accumulation pathways are not well understood. However, bioaccumulation of PCB's at levels $\geq$ 10 mg/kg in fathead minnows has been documented (3).

Because of the known bioaccumulation of these toxic compounds, a rigid limitation is used. If the guideline values are exceeded, the sediments are classified as polluted and unacceptable for open lake disposal no matter what the other data indicate.

	POLLUTED
Mercury	$\geq$ 1 mg/kg dry weight
Total PCB's	$\geq$ 10 mg/kg dry weight

The pollutional classification of sediments with total PCB concentrations between 1.0 mg/kg and 10.0 mg/kg dry weight will be determined on a case-by-case basis.

a. Elutriate test results.

The elutriate test was designed to simulate the dredging and disposal process. In the test, sediment and dredging site water are mixed in the ratio of 1:4 by volume. The mixture is shaken for 30 minutes, allowed to settle for 1 hour, centrifuged, and filtered through a 0.45 μ filter. The filtered water (elutriate water) is then chemically analyzed.

A sample of the dredging site water used in the elutriate test is filtered through a 0.45 μ filter and chemically analyzed.

A comparison of the elutriate water with the filtered dredging site water for like constituents indicates whether a constituent was or was not released in the test.

The value of elutriate test results are limited for overall pollutional classification because they reflect only immediate release to the water column under aerobic and near neutral pH conditions. However, elutriate test results can be used to confirm releases of toxic materials and to influence decisions where bulk sediment results are marginal between two classifications. If there is release or non-release, particularly of a more toxic constituent, the elutriate test results can shift the classification toward the more polluted or the less polluted range, respectively.

b. Source of sediment contamination.

In many cases the sources of sediment contamination are readily apparent. Sediments reflect the inputs of paper mills, steel mills, sewage discharges, and heavy industry very faithfully. Many sediments may have moderate or high concentrations of TKN, COD, and volatile solids yet exhibit no evidence of man made pollution. This usually occurs when drainage from a swampy area reaches the channel or harbor, or when the project itself is located in a low lying wetland area. Pollution in these projects may be considered natural and some leeway may be given in the range values for TKN, COD, and volatile solids provided that toxic materials are not also present.

c. Field observations.

Experience has shown that field observations are a most reliable indicator of sediment condition. Important factors are color, texture, odor, presence of detritus, and presence of oily material.

Color. A general guideline is the lighter the color the cleaner the sediment. There are exceptions to this rule when natural deposits have a darker color. These conditions are usually apparent to the sediment sampler during the survey.

Texture. A general rule is the finer the material the more polluted it is. Sands and gravels usually have low concentrations of pollutants while silts usually have higher concentrations. Silts are frequently carried from polluted upstream areas, whereas, sand usually comes from lateral drift along the shore of the lake. Once again, this general rule can have exceptions and it must be applied with care.

Odor. This is the odor noted by the sampler when the sample is collected. These odors can vary widely with temperature and observer and must be used carefully. Lack of odor, a beach odor, or a fishy odor tends to denote cleaner samples.

Detritus. Detritus may cause higher values for the organic parameters COD, TKN, and volatile solids. It usually denotes pollution from natural sources. Note: The determination of the "naturalness" of a sediment depends upon the establishment of a natural organic source and a lack of man made pollution sources with low values for metals and oil and grease. The presence of detritus is not decisive in itself.

Oily material. This almost always comes from industry or shipping activities. Samples showing visible oil are usually highly contaminated. If chemical results are marginal, a notation of oil is grounds for declaring the sediment to be polluted.

d. Benthos.

Classical biological evaluation of benthos is not applicable to harbor or channel sediments because these areas very seldom support a well balanced population. Very high concentrations of tolerant organisms indicate organic contamination but do not necessarily preclude open lake disposal of the sediments. A moderate concentration of oligochaetes or other tolerant organisms frequently characterizes an acceptable sample. The worst case exists when there is a complete lack or very limited number of organisms. This may indicate a toxic condition.

In addition, biological results must be interpreted in light of the habitat provided in the harbor or channel. Drifting sand can be a very harsh habitat which may support only a few organisms. Silty material, on the other hand, usually provides a good habitat for sludgeworms, leeches, fingernail clams, and perhaps, amphipods. Material that is frequently disturbed by ship's propellers provides a poor habitat.

REFERENCES

1. Jensen, S., and Jernelov, A., "Biological Methylation of Mercury in Aquatic Organisms," Nature, 223 August 16, 1969 pp 753-754.

2. Magnuson, J.J. Forbes, A., and Hall, R., "Final Report - An Assessment of the Environmental Effects of Dredged Material Disposal in Lake Superior - Volume 3: Biological Studies," Marine Studies Center, University of Wisconsin, Madison, March, 1976.

3. Halter, M.T., and Johnson, H.E., "A Model System to Study the Release of PCB from Hydrosoils and Subsequent Accumulation by Fish," presented to American Society for Testing and Materials, Symposium on Aquatic Toxicology and Hazard Evaluation," October 25-26, 1976, Memphis, Tennessee

APPENDIX C

Bottom Sediment Data
1970, 1972, 1974, 1975

Sebewaing River, Michigan
Maintenance and
Flood Control Operations
and Confined Disposal

TABLE 1

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station No.	Depth (ft.)	Sampling Date	Sediment Description			
			Color	Odor*	Oil	Percent Composition
1	5	June 1974	Brown	-	-	90% gravel, 10% pebbles
2	7	June 1974	Brown	-	-	75% sand, 25% gravel
3	9	June 1974	Brown	-	-	100% sand
4	10	October 1975	Gray-brown	Earthy	No	85% silt & clay, 11% sand, 4% gravel
5	11	October 1975	Gray-brown	Earthy	No	67% silt & clay, 25% sand, 8% gravel
6	9	June 1970	Brown	Musty, Moldy	No	75% sand, 25% ooze*
	8	May 1972	Dark Gray	Musty, grassy	No	90% ooze,* 10% sand
	8	June 1974	Gray-brown	-	-	50% leaves, twigs, etc., 25% sand, 25% silt
	7	October 1975	Gray-brown	Earthy	No	80% silt & clay, 12% gravel, 8% sand
7	6	October 1975	Gray-brown	Earthy	No	66% silt & clay, 28% sand, 6% gravel

*Ooze is organic silt.

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Solids Total (percent)	Solids Tot. Vol. (percent)	Chemical Oxygen Demand (mg/kg)	Mercury (mg/kg)	Tot. Kjeldahl Nitrogen (mg/kg/)	Total Phosphorus (mg/kg)	Oil & Grease (mg/kg)
1	Jun 1974	-	1.18	4,600	.1	190	97	200
2	Jun 1974	-	1.0	2,200	.2	170	64	200
3	Jun 1974	-	1.0	3,600	.2	80	99	200
4	Oct 1975	52.2	6.00	56,000	.1	2,100	630	-
5	Oct 1975	56.5	4.82	43,000	.1	1,900	550	-
6	Jun 1970	70.8	3.1	8,500	.3	1,020*	990	580
	May 1972	53.0	4.7	51,000	—	1,200	470	900
	Jun 1974	-	6.88	64,000	.3	2,400	460	700
	Oct 1975	30.9	10.3	120,000	.1	5,500	620	1,400
7	Oct 1975	29.7	11.0	130,000	.1	5,700	840	1,100
EPA Suggested Limits			6.0	50,000	1	1,000	---	1,500

*Total of Ammonia Nitrogen and Organic Nitrogen.

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Zinc (mg/kg)	Lead (mg/kg)	Phenol (ug/kg)	Total Iron (mg/kg)	Barium (mg/kg)	Cobalt (mg/kg)
1	Jun 1974	17	10	--	3,800	60	15
2	Jun 1974	21	10	--	3,000	60	14
3	Jun 1974	16	10	--	3,700	60	14
4	Oct 1975	72	49	--	20,000	--	--
5	Oct 1975	59	34	--	16,000	--	--
6	Jun 1970	--	--	.17	8,900	--	--
	May 1972	--	--	.18	--	--	--
	Jun 1974	70	15	--	14,000	60	26
	Oct 1975	81	47	--	19,000	--	--
7	Oct 1975	72	44	--	16,000	--	--
EPA Suggested Limits		50	50	--	--	--	--

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Manganese (mg/kg)	Nickel (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)
1	Jun 1974	140	90	2	3.9	5	3
2	Jun 1974	75	130	3	4.0	12	3
3	Jun 1974	93	110	2	4.9	9	3
4	Oct 1975	40	46	6	2	24	21
5	Oct 1975	300	27	6	2	21	16
6	Jun 1970	--	--	-	--	--	--
	May 1972	--	--	-	--	--	--
	Jun 1974	250	180	3	7.5	66	5
	Oct 1975	370	48	6	2	25	26
7	Oct 1975	330	40	7	2	22	26

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station No.	Depth (ft.)	Sampling Date	Sediment Description			
			Color	Odor*	Oil	Percent Composition
8	8	June 1970	Lt. brown	Musty, Moldy	No	100% ooze*
	8	May 1972	Dark brown	Musty	No	99% ooze,* 1% twigs
	8	June 1974	Gray-brown	--	--	80% leaves, twigs, etc., 20% silt
9	6	October 1975	Brown	Earthy	No	63% silt & clay, 28% sand, 9% gravel
10	9	June 1970	Dark gray	Musty, Moldy	No	95% mud, 5% weeds
11	7	October 1975	Brown	Earthy	No	71% silt & clay, 23% sand, 6% gravel
12	8	May 1972	Dark brown	Musty	No	99% ooze,* 1% twigs
	8	June 1974	Gray-brown	--	--	80% silt, 20% plant fibres
13	8	May 1972	Dark Gray	Grassy, Musty	No	100% ooze*
	8	June 1974	Gray-brown	--	--	85% sand, 10% wood chips, etc., 5% ooze*

*Ooze is organic silt.

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Solids Total (percent)	Solids Tot. Vol. (percent)	Chemical Oxygen Demand (mg/kg)	Mercury (mg/kg)	Tot. Kjeldahl Nitrogen (mg/kg/)	Total Phosphorus (mg/kg)	Oil & Grease (mg/kg)
8	Jun 1970	33.7	9.0	120,000	.6	3,330*	2,100	2,300
	May 1972	38.2	7.5	90,000	--	2,900	580	1,900
	Jun 1974	--	9.50	95,000	.3	3,100	490	200
9	Oct 1975	58.2	2.90	30,000	.1	1,200	245	400
10	Jun 1970	27.1	8.4	130,000	.8	4,510*	2,400	3,200
11	Oct 1975	44.4	4.94	62,000	.1	2,600	370	700
12	May 1972	40.4	7.0	84,000	--	2,400	540	3,000
	Jun 1974	--	9.82	69,000	.2	2,700	780	440
13	May 1972	32.6	8.1	120,000	--	4,300	610	2,000
	Jun 1974	--	3.84	31,000	.2	1,400	190	200
EPA Suggested Limits			6.0	50,000	1	1,000	--	1,500

*Total of Ammonia Nitrogen and Organic Nitrogen.

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Zinc (mg/kg)	Lead (mg/kg)	Phenol (ug/kg)	Total Iron (mg/kg)	Barium (mg/kg)	Cobalt (mg/kg)
8	Jun 1970	--	--	--	16,000	--	--
	May 1972	--	--	.25	--	--	--
	Jun 1974	78	15	--	16,000	60	33
9	Oct 1975	31	22	--	7,000	--	--
10	Jun 1970	--	--	.74	13,000	--	--
11	Oct 1975	43	30	--	10,000	--	--
12	May 1972	--	--	.23	--	--	--
	Jun 1974	130	15	--	30,000	60	35
13	May 1972	--	--	.29	--	--	--
	Jun 1974	28	10	--	6,200	60	23
EPA Suggested Limits		50	50	--	--	--	--

TABLE 1 (CONT.)

EPA Bottom Sediment Sample Analysis

Sebewaing - 1970, 1972, 1974, 1975

Station Number	Sampling Date	Manganese (mg/kg)	Nickel (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)
8	Jun 1970	--	--	--	--	--	--
	May 1972	--	--	--	--	--	--
	Jun 1974	350	200	3	7.5	56	5
9	Oct 1975	160	14	4	2	11	12
10	Jun 1970	--	--	--	--	--	--
11	Oct 1975	210	17	4	2.1	15	15
12	May 1972	--	--	--	--	--	--
	Jun 1974	490	220	4	7.5	53	10
13	May 1972	--	--	--	--	--	--
	Jun 1974	130	240	2	5.2	260	5

TABLE 2

Dredged Material Disposal Site A-1 Sediment Analysis
Sebewaing - 1978

A. MISCELLANEOUS PARAMETERS

Parameter	Sample #		
	1	2	3
Total Solids %	43	66	60
Vol. Solids (as % Tot. Solids)	9.7	3.2	4.2
COD	27,000	24,000	24,000
TKN ppm	1688	2150	2500
Oil & Grease (Dry Wt.)	591	853	530
Metals (Dry Wt.) ppm			
Cr	10	14	16
Cu	9.1	11	22
Ni	10	10	22
Mn	105	168	281
Zn	22	24	40
Cd	1.9	2.2	2.8
Pb	5.3	6.2	7.8
Fe	4,225	7,900	14,750
As	1.8	1.9	3.8

Table 2 Continued

B. ORGANIC PARAMETERS
(ppm dry wt.)

Parameter	Sample # 1	2	3
o,p'	0.003	0.005	0.001
P,P' DDE	0.004	0.003	0.003
Methoxychlor	< 0.001	< 0.001	< 0.001
Lindane	0.009	0.001	0.005
Heptachlor	0.006	0.006	0.002
Aldrin	< 0.001	< 0.001	< 0.001
Strobane-T	< 0.01	< 0.01	< 0.01
Parathion	< 0.001	< 0.001	< 0.001
Demeton	< 0.005	< 0.005	< 0.005
Mevenphos	< 0.005	< 0.005	< 0.005
Dieldrin	< 0.001	< 0.001	< 0.001
Endrin	< 0.001	< 0.001	< 0.001
O,P' TDE	< 0.001	< 0.001	< 0.001
O,P, DDT	< 0.001	< 0.001	< 0.001
PP' TDE	< 0.001	< 0.001	< 0.001
P,P' DDT	< 0.001	< 0.001	< 0.001
Chlordane	< 0.01	< 0.01	< 0.01
Azinphos	< 0.005	< 0.005	< 0.005
Malathion	< 0.005	< 0.005	< 0.005
Mirex	< 0.001	< 0.001	< 0.001
PCB (as 1254)	< 0.001	< 0.001	< 0.001
2, 4 D	< 0.7	< 0.02	< 0.02
2,4,5 TP	< 0.02	< 0.02	< 0.02
2,4,5 T	< 0.02	< 0.02	0.02

APPENDIX D

Biology Data

Sebewaing River, Michigan
Maintenance and
Flood Control Operations
and Confined Disposal

SEBEWAING RIVER MACROINVERTEBRATES

6/4/74

DIPTERA	A	B	C	E	F	H	I
Cryptochironomus sp.	1			8	8		1
Stictochironomus sp.	294						
Chironomus sp.	6				8		
Microtendipes sp.	3						
Micropsectra sp.	1	1					
Rheotanytarsus sp.	1						
Harnischia sp.	1						
Polypedilum sp.		38	8				175
Procladius sp.				24	8	24	16
Harnischia sp.						4	1
TRICHOPTERA							
Psychomyudae							1
OLIGOCHAETA							
Limnodrilus sp.	1	3	24	96	472	140	48
Tubifex sp.				8	40	4	
AMPHIPODA							
Gammarus fasciatus					64	4	
OTHERS							
Nematoda					8		

HARBOR: Sebewaing, Michigan

SAMPLED: October 30, 1975

TAXA	NUMBER OF ORGANISMS FOR EACH TAXA D	G
DIPTERA		
Chironomus sp.	1	1
Cryptochironomus sp.		1
Chaoborus sp.	2	
Procladius sp.	2	
OLIGOCHAETA		
Limnodrilus sp.	42	42
Total No. of organisms	47	44
Total No. of taxa	4	3

APPENDIX E

Correspondence

Sebewaing River, Michigan
Maintenance and
Flood Control Operations
and Confined Disposal

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C52/JLR

JAN 25 1978

JAN 24 1978

TO: William Aron
Director
Office of Ecology and Environmental Conservation

FROM: Gordon Lill
Deputy Director
National Ocean Survey

SUBJECT: DEIS #7712.29 - Operation and Maintenance, Confined Disposal Facility and Flood Control Facilities

The subject statement has been reviewed within the areas of NOS responsibility and expertise, and in terms of the impact of the proposed action on NOS activities and projects.

The following comment is offered for your consideration.

Geodetic control survey monuments may be located in the vicinity of the proposed disposal sites. If there is any planned activity which will disturb or destroy these monuments, NOS requires not less than 90 days' notification in advance of such activity in order to plan for their relocation. NOS recommends that funding for this project includes the cost of any relocation required for NOS monuments.

JAN 16 1978

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Great Lakes Environmental Research Laboratory
2300 Washtenaw Avenue
Ann Arbor, Michigan 48104

January 13, 1978

TO : Director
Office of Ecology and Conservation

FROM : Eugene J. Aubert
Director, GLERL, RF24

SUBJECT: DEIS 7712.29 - Operation and Maintenance, Confined Disposal Facility and Flood Control Facilities, Sebewaing River, Michigan

The subject DEIS prepared by the Corps of Engineers, Detroit District, on maintenance of navigation and flood control facilities on the Sebewaing River, Lake Huron has been reviewed and comments herewith submitted.

There are no objections to maintenance dredging in the Sebewaing River and disposal of the polluted spoil in a confined area later to be used for Sebewaing Airport expansion.

Volume of polluted sediment deposits in the river depends on Lake Huron level and river flow. With lake levels going down, more of the highly movable ooze will be transported and deposited in lower river reaches and in the lake. The location and volume of polluted deposits should be ascertained prior to the dredging.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION 5
18209 DIXIE HIGHWAY
HOMEWOOD, ILLINOIS 60430

January 10, 1978

IN REPLY REFER TO
HED-05

U.S. Army Engineer District, Detroit
P. O. Box 1027
Detroit, Michigan 48231

ATTN: Chief, Environmental Resources Branch

Gentlemen:

The draft environmental statement for operation and maintenance of a confined disposal facility and flood control facility, Sebewaing River, Michigan, has been reviewed. It is noted in the probable impacts section 4.27, only the noise and air impacts directly associated with the dredging operations and structural repairs are addressed. Section 5.09, however, also indicates other short term impacts from hauling are expected, including noise, safety, etc. It is recommended the probable impacts section include discussions of hauling impacts such as noise, dust, safety, etc., since they are construction impacts.

Sincerely yours,

Donald E. Trull
Regional Administrator

By: W. G. Emrich

W. G. Emrich, Director
Office of Environment and Design

United States Department of the Interior

OFFICE OF THE SECRETARY
NORTH CENTRAL REGION
2510 DEMPSTER STREET
DES PLAINES, ILLINOIS 60016

(ER-77/1144)

January 30, 1978

Colonel Melvyn D. Remus
District Engineer
U.S. Army Engineer District
Detroit
P.O. Box 1027
Detroit, Michigan 48231

Dear Colonel Remus:

We have reviewed the draft environmental statement and letter report for confined disposal facility and flood control facilities, Sebewaing River, Huron County, Michigan, and find both to be inadequate.

To avoid or minimize conflict with recreational boating, the letter report should include specific provisions for maintenance dredging of the channel to occur outside of the prime recreation season. This is alluded to in the second paragraph on page 7 of the letter report, which states that "It is anticipated that future maintenance dredging of the entire channel will be done in early spring or in the fall to avoid interference with recreational boating traffic in the river."

The State Historic Preservation Officer has reviewed the proposed project as indicated by an appended letter (DES, p. E-2). However, the final environmental statement should document further correspondence with the SHPO regarding on-land disposal sites as requested in her letter (DES, p. E-2). If the SHPO recommends archeological surveys of the proposed disposal sites, such surveys should be conducted prior to the preparation of the final document so that survey methods and resource evaluations can be discussed in the document. If any discovered sites are deemed eligible for inclusion in the National Register of Historic Places, the final statement should reflect measures taken to comply with Section 106 of the National Historic Preservation Act of 1966.

In general, the draft environmental statement does not adequately assess the environmental impacts from the disposal of non-polluted dredge materials into the aquatic environment at the mouth of the Sebewaing River. There seems to be confusion as to whether the south breakwater will be reconstructed at the mouth of the Sebewaing River, and if so, to what extent

the resulting impacts will be on fish and wildlife resources.

We have the following specific comments on the draft statement which we believe should be addressed.

Disposal Operations

On page 6, paragraph 1.19 states that the disposal of uncontaminated dredged materials will be into the nearshore areas, if possible; and in the areas on or adjacent and parallel to the north or south channel breakwater. At present there is no south breakwater. Replacement of the south breakwater will destroy aquatic habitat. Disposal of the uncontaminated dredged materials into nearshore areas could have adverse impacts on fish and benthic organisms and these potential impacts should be addressed.

River Sediment Quality

Inasmuch as channel sediments contain excessive concentrations of toxic substances (p. 22, par. 2.37 and 2.38), measures such as sediment barriers should be considered to minimize the migration of contaminated suspended material within the turbidity plume during dredging operations.

Disposal Sites; Non-contaminated Dredged Material

On page 31, paragraph 2.70 again states that the non-contaminated dredged material is proposed for disposal on the river mouth breakwaters and to areas immediately adjacent to the outside surfaces of these structures. The impacts of such proposals should be addressed.

Structures

Page 35, paragraph 2.82 should be corrected to indicate that only one breakwater exists today. Reconstruction of the missing breakwater on the south side of the channel in the same manner as before will impact the aquatic habitat.

Wildlife Habitat

Page 50, paragraph 4.29 discusses the impact of placing the materials on the breakwaters and the effect on terrestrial wildlife. Effects on the aquatic organisms should be included.

Benthos

Page 53, paragraph 4.41 references the U.S. Fish and Wildlife Service as a source of information concerning the quick recolonization of dredged

areas and disposal sites by benthic organisms. Identification of the type of communication, whether personal or a reference study, would fully document this important reference on benthic recolonization. This would allow future environmental impact statements and other persons who rely on the factual information contained in such documents, to accurately assess the findings.

Disposal Operations

Page 73, paragraph 5.07 should be corrected to depict what will actually happen to the uncontaminated dredged materials in depositing or upgrading the existing channel protection sidecast structures at the river mouth. Will the southern sidecast structure be rebuilt? If so, to what extent will its reconstruction impact the aquatic environment?

Confined Disposal of Contaminated Sediments

On page 80, paragraph 6.22, the first sentence should be corrected. The U.S. Fish and Wildlife Service does not judge the 11-acre borrow pit west of the airport to be a valuable waterfowl staging area.

Irreversible and irretrievable commitment of resources which would be involved in the proposed action should it be implemented

Page 94, paragraph 8.03 states that terrestrial organisms will be displaced from the disposal breakwaters and structures during disposal and structural repair operations. If the south breakwater is constructed there will also be permanent loss of aquatic habitat at that site. The reconstruction of the south breakwater appears to be an unnecessary action. The past history at Sebewaing indicates that high waters have eroded the south structure. It is our opinion that the replacement of the south structure is not justified and appears unnecessary.

Figure 4, page 107 shows a map of the proposed disposal sites for the unpolluted dredged material at the mouth of the Sebewaing River, Sebewaing, Michigan. The arrow on the map points to the north structure as a disposal area, but in the legend it indicates disposal sites and reconstructs the south breakwater marked in darker ink to indicate its projected use as a disposal site. The question remains unanswered in the environmental statement as to whether the past sidecast method will be employed to rebuild the south breakwater.

Sincerely yours,

David L. Jervis
Regional Environmental Officer

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA STATE AND PRIVATE FORESTRY
370 REED ROAD — BROOMALL, PA. 19008
(215) 596-1672

1950
February 15, 1978

Mr. P. McCallister
Chief, Engineering Division
U. S. Army Engineer District, Detroit
Attn: Chief, Environmental Resources Branch
P. O. Box 1027
Detroit, Michigan 48231

Refer to: NCEED-ER, Draft
Environmental Statement
Confined Disposal Facility
Sebewaing, MI

Dear Mr. McCallister:

We favor the use of Sites A-1 through A-4 as described in Section 6, because alternate sites would have an adverse effect on wetlands or on upland vegetation. We endorse the creation of marshes to mitigate the cumulative losses of wetlands, an increasingly scarce resource.

Thank you for the opportunity to comment on this draft statement.

Sincerely,

DALE O. VANDENBURG
Staff Director
Environmental Quality Evaluation

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 101, 1405 South Harrison Road, East Lansing, Michigan 48823

January 12, 1978

Colonel Phil McCallister
U.S. Army Engineer District
Attention: Chief, Environmental Resources Branch
P. O. Box 1027
Detroit, Michigan 48231

Dear Sir:

We have reviewed the draft Environmental Impact Statement for the operation and maintenance, confined disposal facility, and flood control facilities at Sebewaing, Michigan. We have no comment to make.

Sincerely,

Arthur H. Cratty
State Conservationist

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

FEB 22 1978

Mr. P. McCallister
Chief, Engineering Division
Detroit District
U.S. Army Corps of Engineers
P.O. Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

We have completed our review of the Draft Environmental Impact Statement (EIS) for Operation and Maintenance, Confined Disposal Facility and Flood Control Facilities at Sebewaing, Michigan. As you know, our office has coordinated with your staff extensively concerning confined disposal at Sebewaing, and for the most part, the plans presented in the Draft EIS coincide with those we agreed to at the June 29, 1977 Confined Disposal Site Selection Committee Meeting. However, there are some points which we believe require clarification.

As indicated above, our office, as well as the U.S. Fish and Wildlife Service and Michigan Department of Natural Resources, worked extensively with your staff to select a site for confined disposal at Sebewaing which would allow social benefits to be derived from the proposal yet would minimize wetland impacts. From information presented in the Draft EIS, it appears that spoil obtained from the September 1977 emergency dredging was placed on the wetland area which it was agreed to protect. Consequently, we believe remedial measureas to rehabilitate the wetlands impacted by emergency dredging should be developed and included in the Final EIS. We offer the following additional comments for your use in preparing the Final EIS.

Pages B-20 and B-23 list our Agency's old criteria for determining acceptability of dredged spoil disposal. The old criteria should be replaced with our April 1977 "Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments", copy attached. Also, the Letter Report for Diked Dredge Disposal Area should contain our April 1977 Guidelines along with the most recent sediment survey results.

On page 39, paragraph 3.08, the U.S. Environmental Protection Agency should be added to the list of those who agreed to limit the size of the proposed facility to exclude as much of the marsh as possible.

Minutes from the June 29, 1977, Site Selection Committee Meeting on Sebewaing show that, originally, site A-1 was planned to hold 20,000 cubic yards of spoil, the balance of the material being placed in Sites A-2, 3, and 4 and Site L or Site A-5. We note from the Draft EIS that it is proposed to excavate Site A-1 to allow for a capacity of the total 84,000 cubic yards. Sites A-3 and A-4 would then be filled with the material excavated from A-1. It is assumed that material excavated from A-1 is unpolluted and that runoff from A-3 and A-4 would involve clean sediment only. It should be explained on what basis the material from A-1 was determined to be unpolluted. Also, it should be determined if enlarging the capacity of A-1 will affect the water regime within the surrounding wetlands.

The Final EIS should indicate who will be monitoring the overflow from the confined disposal facility.

Through verbal communication with your staff, our Agency was requested to determine if open lake disposal would be acceptable for Sebewaing. Considering the potential for upland disposal at Sebewaing, restricted open lake disposal would be unacceptable.

In accordance with U.S. EPA's procedures, we have classified our comments on the proposed project as ER, environmental reservations, and rated the Draft EIS as Category 2, additional information required.

We appreciate the opportunity to comment on the subject document. Please send us three copies of the Final EIS at the same time that it is filed with U.S. EPA in Washington. If you have any questions regarding our comments, please contact Ms. Barbara Taylor at 312/353-2307.

Sincerely,

Susan P. Walker, Chief
Environmental Impact Review Staff
Office of Federal Activities

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION V
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

August 29, 1977

Mr. P. McCallister
Chief, Engineering Division
Department of the Army
Detroit District, Corps of Engineers
Box 1027
Detroit Michigan 48231

Dear Mr. McCallister:

Reference is made to your letter of July 15, concerning the minutes of the Site Selection Committee's meeting of June 29, 1977 for disposal of dredged material from Sebewaing River, Michigan. We believe the minutes present an accurate account of the June 29, 1977, meeting and we have no corrections or additions to make. We concur with the sites described in Item 7 of the minutes for disposal of polluted dredged material. Specifically, use of Site A-1 (a 300 foot wide strip running from the end of the existing runway to the south edge of the Sebewaing River Channel); Sites A-2,3, and 4; and site "L" or Site A-5 for the balance of the material. We understand that use of Site A-5 is contingent upon interpretation of a Michigan State law which designates the area as an environmentally sensitive area.

Thank you for the opportunity to review the subject minutes.

Sincerely yours,

Ronald L. Mustard

Ronald L. Mustard, Acting Chief
Environmental Review Section

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-3111

January 25, 1978

Mr. P. McCallister
Detroit District, Corps of Engineers
Department of the Army
Post Office Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

This is in reference to your draft environmental impact statement entitled, "Sebewaing River, Michigan Operation and Maintenance of Navigation, Confined Disposal Facility, and Flood Control Facilities." The following comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving eight (8) copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures: Memos from: Mr. Gordon Lill
Deputy Director
National Ocean Survey

Mr. Eugene J. Aubert
Director, GLERL, RF24

MICHIGAN DEPARTMENT OF STATE
RICHARD H. AUSTIN SECRETARY OF STATE

LANSING
MICHIGAN 48918

MICHIGAN HISTORY DIVISION
ADMINISTRATION, ARCHIVES, HISTORIC SITES, AND PUBLICATIONS
3423 N. Logan Street
517-373-0510
STATE MUSEUM
505 N. Washington Avenue
517-373-0515

December 28, 1977

U. S. Army Corps of Engineers, Detroit District
P.O. Box 1027
Detroit, Michigan 48231

Attn: Chief, Environmental Resource Branch

Dear Sir:

We have reviewed the Draft Environmental Statement, "Letter Report for Diked Disposal Area: Sebewaing, Michigan." We note that the statement contains no reference to our October 1, 1976, communication regarding the project (copy enclosed), in which an archaeological survey was requested for certain alternatives. The designated areas should, if proposed for impacts, be surveyed prior to construction.

If you have further questions, please contact Dr. Lawrence Finfer, Environmental Review Coordinator for the Michigan History Division. Thank you for giving us the opportunity to comment.

Sincerely yours,

Martha M. Bigelow

Martha M. Bigelow
Director, Michigan History Division
and
State Historic Preservation Officer

MMB/LF/cw

MICHIGAN DEPARTMENT OF STATE
RICHARD H. AUSTIN SECRETARY OF STATE

LANSING
MICHIGAN 48918

MICHIGAN HISTORY DIVISION
ADMINISTRATION, ARCHIVES,
HISTORIC SITES, AND PUBLICATIONS
3423 N. Logan Street
517-373-0510
STATE MUSEUM
505 N. Washington Avenue
517-373-0515

October 1, 1976

Mr. P. McCallister
U. S. Army Corps of Engineers, Detroit District
P. O. Box 1027
Detroit, Michigan 48231

Dear Sir:

Our staff has reviewed the proposed diked disposal facilities for Sebewaing and Port Austin, Huron County. Their comments are summarized below.

Port Austin: The use of sites A, B, C, or D will have no effect on cultural resources. Records on file at the Museum of Anthropology, University of Michigan, indicate that site E may contain archaeological sites; if chosen, it should be surveyed prior to construction activity.

Sebewaing: The use of sites A1 or A2 will have no effect on cultural resources. Sites A3, A4, and L, however, may contain archaeological sites; if chosen, they should be surveyed prior to construction.

If you have further questions, please contact Dr. Lawrence Finfer, Environmental Review Coordinator. Thank you for giving us the opportunity to comment.

Sincerely yours,

Martha M. Bigelow
Director, Michigan History Division
and
State Historic Preservation Officer

MMB/LF/cw

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, BOX 30028, LANSING, MICHIGAN 48909
HOWARD A. TANNER, Director

March 22, 1978

Mr. P. McCallister
Chief, Engineering Division
Department of the Army
Corps of Engineer
Detroit District
Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

Thank you for the opportunity to review the Letter Report for Diked Dredge Disposal Area and the Draft Environmental Statement, Sebewaing River, Michigan, dated November 1977.

We have reviewed the subject reports and determined there will be no adverse long-term effects on water quality or aquatic life. The proposal is accurately presented and responds in an acceptable manner to the needs for disposal of spoil material from this project.

Sincerely,

Howard A. Tanner

Howard A. Tanner
Director

MICHIGAN

MI 0230 10/76

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T MASON BUILDING BOX 30028 LANSING MICHIGAN 48909
HOWARD A TANNER Director

July 22, 1977

Mr. Philip A. McCallister, Chief
Engineering Division
U. S. Corps of Engineers
P. O. Box 1027
Detroit, Michigan 48231

Dear Mr. McCallister:

This will acknowledge your letter of July 15, together with the summary of the Corps' meeting at Sebewaing concerning the dredged material disposal project. We have reviewed the results of this meeting with members of the Department's Dredge Spoil Review Committee and support the sites selected as defined in your letter. Therefore, the Department of Natural Resources approves the selection of Site A-1, a 300 ft. wide strip running from the end of the existing county airport runway to the southern edge of the Sebewaing River channel, and Sites A-2, A-3 and A-4, located in and adjacent to the airport property, and Site L for the balance of any materials from this project. Site A-5, which was proposed to be an alternate to Site L is located within a proposed environmental area, and therefore, not acceptable as a disposal area. We trust that this will now move the project along for approvals and ultimate bid letting.

We would also like to comment briefly on the deposition of clean dredged materials coming from the Sebewaing River project. We understand that at the meeting in Sebewaing, no unanimous method of disposal was agreed to by the various participants. We will be discussing this matter further with the committee to determine what is an acceptable method and will communicate our position to your office shortly.

Sincerely yours

BUREAU OF LAND & WATER MANAGEMENT

Dale W. Granger, P.E., Chief
Water Management Division

by: M. C. Nielsen, Chief
Submerged Lands Management Section

DWG/MCN:cjs
cc: D. Granger
Members, Dredge Spoil Review Committee

February 13, 1978

MICHIGAN UNITED CONSERVATION CLUBS
2101 Wood St. ● P.O. Box 30235 ● Lansing, MI 48909 ● 517-371-1041

Melvyn D. Remus, Colonel
U.S. Army Corps of Engineers
Detroit District Engineer
P.O. Box 1027
Detroit, MI 48231

Dear Colonel Remus:

RE: Draft Environmental Statement - Sebewaing River, Michigan; Operation & Maintenance, Confined Disposal Facility & Flood Control Facilities

The Michigan United Conservation Clubs would like to offer these comments in response to the above referenceddraft environmental statement (DES) concerning disposal of dredged materials from the Sebewaing River on Saginaw Bay. We previously responded to the "Environmental Overview of Alternative Sites—Sebewaing Harbor Dredge Disposal Area" by letter of June 22, 1977. We also discussed the project at length by telephone with Mr. Don Williams of your staff and offered several comments on the DES.

In our June 22, 1977 letter, MUCC objected to the project as proposed due to the filling of wetlands. We again refer to that letter and note that Executive Order 11990 on the Protection of Wetlands does apply to this project. It states that "each agency, to the extent permitted by law, shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction . . ."

The DES discusses "Compliance with Laws and Regulations" (p. 68-70). However, the Executive Order is not mentioned. No explanation is offered as to how this proposed project will comply with that order. No alternative solution is discussed if no wetlands are filled. For example, could that incremental loss by decreasing the size of site A-1 be made up by disposal on sites A-3 and/or A-4? Could site A-1 be excavated to a greater depth to accommodate additional fill? Are there other alternatives to eliminate the need to fill marshland? What are the relative costs of avoiding marsh filling?

In our June 22, 1977 letter, we stated that we could not support near shore marsh restoration to mitigate lost wetlands. However, if wetlands are to be filled in spite of our objections, mitigation should be considered. The DES mentions the possibility of such mitigation, but is ambiguous as to whether it is a part of the proposed action. Our understanding is that such mitigation has been deleted from consideration. Why?

The size of the proposed site A-1 is not consistent in the DES. On page 7, it is 9 acres; on page 32, 11-12 acres; on page 60, 11 acres; and on page 96, 11-13 acres. The wetlands proposed for filling on site A-1 vary from 2 to 3 acres in the DES.

A discussion of the "Watershed Management and Pollution Control" is included on pages 85-86. The DES downplays the importance of such controls ("not economically feasible," "would not completely eliminate the need for future maintenance dredging"). It states that "reductions of contaminants discharged to the environment does affect society and those costs are ultimately passed on to the consumer as higher prices for goods and services." Is that offered as a justification for poor soil management practices in the Saginaw Bay watershed? No mention is made of the increased costs to taxpayers of dredging lost topsoil from our waterways, the costs of containing that polluted material, the cost to society from increased pollution and turbidity in the Saginaw Bay, and the long-term costs to society of mining productive topsoils.

In summary, we trust these questions will be addressed in the final environmental statement and we reserve further comment on this project until that document is released for review.

Very truly yours,

Wayne A. Schmidt
Staff Ecologist

WS: sk

APPENDIX F

Archeological Survey

Sebewaing River, Michigan

Maintenance and

Flood Control Operations

and Confined Disposal

A Preliminary Assessment of Archaeological Potential on Proposed Disposal Sites for Contaminated Dredged Materials in Sections 7 and 19, Sebewaing Township, Huron County, Michigan

A Report by
Deborah Bush Black
Division of the Great Lakes
Museum of Anthropology
University of Michigan

U.S. Army Corps of Engineers
Detroit District
February 1978

Introduction

In February, 1978, The Environmental Research Group, Inc. of Ann Arbor, Michigan, requested the Division of the Great Lakes of the Museum of Anthropology, University of Michigan, to prepare a report on the archaeological potential of four proposed disposal sites for contaminated dredged materials in Sections 7 and 19 of Sebewaing Township, Huron County, Michigan. Proposed disposal site A-1 lies in the NW 1/4 of Section 7 (See Fig. 1). This site, if accepted for disposal, would be excavated approximately 5.5 feet to accomodate contaminated materials dredged from Sebewaing Harbor (U.S. Army Corps of Engineers, 1977:7). Excavation of the area may impact archaeological resources. Proposed disposal sites A-3 and A-4 lie in the S 1/2 of Section 7 (See Fig. 1). Sites A-3 and A-4, if accepted for disposal, would not be excavated but would receive materials excavated from site A-1. Proposed site L lies in the N 1/2 of Section 19 (See Fig. 1). Site L, if accepted for disposal, would also receive excavated materials from site A-1. Disposal of excavated material from A-1 on A-3, A-4 and L may impact archaeological resources as heavy bull dozers and end loaders will be required to distribute the excavated material over the land surface.

The assessment of archaeological potential for each of the four proposed disposal sites is based upon physiographic features of the study areas, present knowledge of prehistoric and early historic subsistence-settlement patterns along Michigan's lake shores, and reports of previous archaeological resources in the study areas.

Physiographic Background

Proposed disposal sites A-1, A-3 and A-4 lie in Section 7 along the shore of Saginaw Bay of Lake Huron. This study area lies on glacial lake plain with

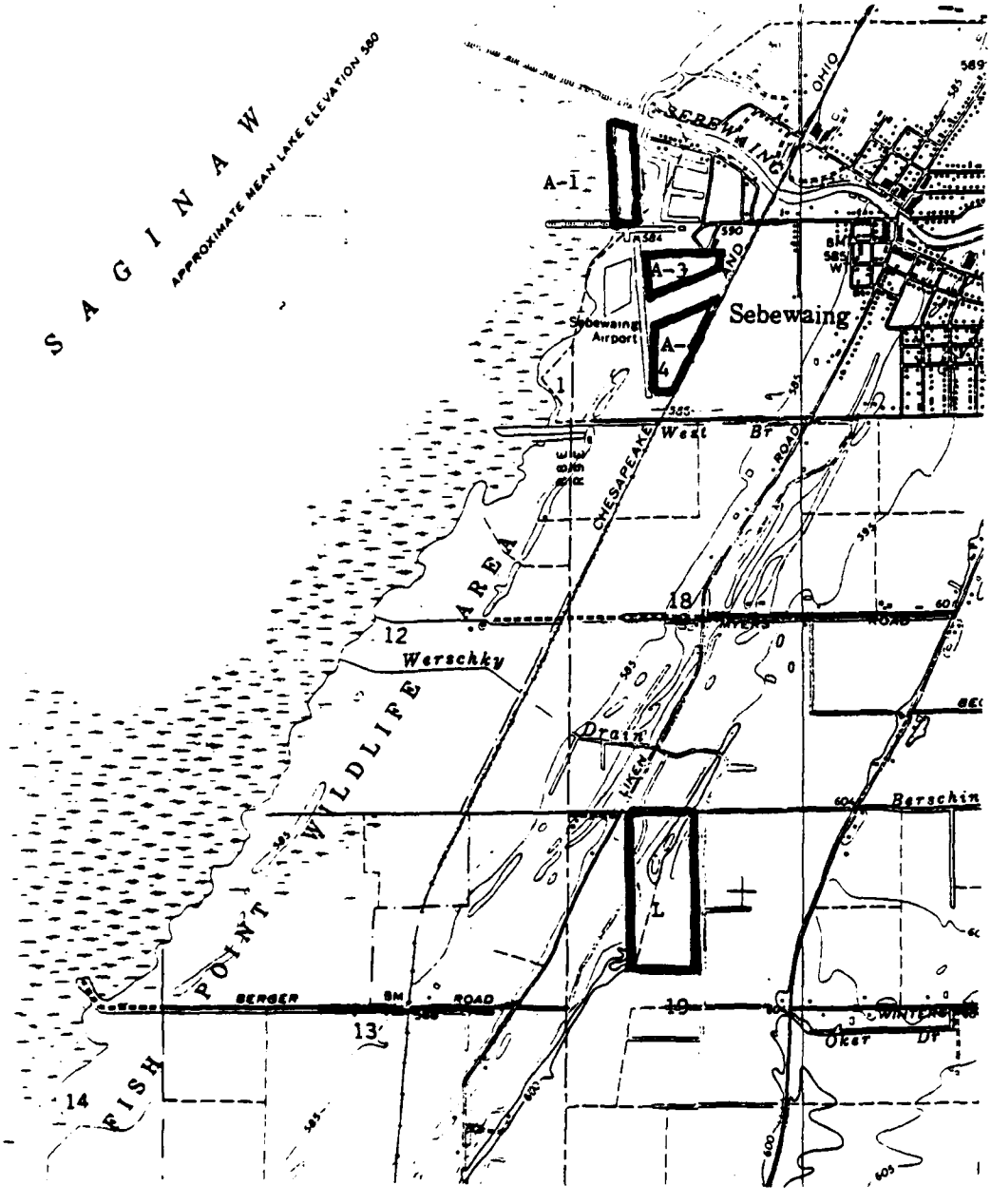
SAGINAW
APPROXIMATE MEAN LAKE ELEVATION 580
A-1
A-3
A-4
Sebewaing
Sebewaing Airport
SEBEWAING
OHIO
CHESAPEAKE
West
BF
ROAD
FISH POINT WILDLIFE AREA
Werschky
Drain
Berschin
BERGER
ROAD
Oker
12
13
14
18
19

FIGURE 1.

a local relief of only six feet. Soils along the bay shore are sandy.

Prehistorically, glacial lake waters would have covered sites A-1, A-3 and A-4 during stages of the last glaciation. During major periods of early human habitation in the State of Michigan, Section 7 would have been flooded and uninhabited by human populations. The Algonquin beach ridge at 605' to 620' a.s.l. formed the shore of Lake Huron between around 13,000 - 11,000 B.P. during Paleo-Indian occupation of Michigan. The lake level then gradually lowered to the Lake Chippewa-Stanley stage of 190' a.s.l., at around 9,500 B.P. Between 9,500-4,500 B.P. the lake levels rose to the Nipissing stage at 605' a.s.l., and a second beach was cut on the Lake Algonquin beach remnant. Water then lowered between 3,500 - 2,000 B.P. with a pause at 595' a.s.l. during the Algoma lake stage. Lake waters dropped to their current level of 580' a.s.l. by 2,000 B.P. (Kelley and Farrand, 1967).

Resources such as seasonally abundant fowl, fish, game, and seed plants which are critical to many hunting and gathering subsistence economies, would have been available along the bay shore from about 8,000 B.P. to recent times (Fitting, 1970). The fluctuating borders of the bay shore marsh environments and the inland maple-basswood-beech forests which corresponded with fluctuating lake levels from 8,000 to 2,000 B.P. would have created fluctuations in Native American settlement patterns. During time intervals when rich subsistence resources were proximal to the study area in Section 7, the potential for aboriginal seasonal exploitation of resources in this area would have been great. Extractive hunting and foraging activity debris and base camp habitation debris may be expected along the bay shore in Section 7.

The Sebewaing River, a relatively small stream which drains a relatively flat watershed of about 40 square miles, enters Saginaw Bay immediately to the north of disposal site A-1 (See Fig. 1). Well-drained lands at the mouths of rivers were desirable locations for both prehistoric and early historic

sedentary settlements. At the mouths of rivers, many diverse economic activities could be concentrated, and the rivers provided transportation routes to diverse inland environments. On well-drained land in Section 7, both prehistoric and early historic Native American and early historic Euro-American settlements may be expected at the mouth of the Sebewaing River. The occurrence of well-drained land along the river in Section 7 would have fluctuated in direct relation to fluctuating lake levels. If the disposal sites in Section 7 were poorly drained throughout the prehistoric and early historic periods, the potential for large settlements on these sites is low.

Based upon the physiographic history of the study area, the general potential for archaeological sites in Section 7 is great. However, a close examination of each disposal site provides a more adequate assessment of archaeological potential.

Disposal site A-1 consists of approximately three acres of shallow fresh-water marsh and approximately eight acres of woods (U.S. Army Corps of Engineers, 1977:32). This site lies at 580' a.s.l. and would have been flooded throughout most of the prehistoric period. The marsh evolved during the high water stages of recent Lake Huron. Apparently, the total site has been used in recent years for the disposal of dredged materials (U.S. Army Corps of Engineers, 1977:32). Cultural materials may have been deposited in the marsh area during low stages of glacial Lake Chippewa-Stanley, but these materials will not be visible or recoverable by archaeological survey. Cultural materials may have been deposited in the wooded area during the low stages of Lake Chippewa-Stanley and since the establishment of the modern lake level (since 2000 B.P.). These materials may have been destroyed by fluctuating lake waters and or buried by marsh/forest deposition and recent dredged material fill. The potential for discovering evidence of any archaeological sites in such a wooded area is fair utilizing current archaeological survey methods. Since marsh waters

have covered the site throughout most of the prehistoric period, archaeological potential for base camps, villages, cemeteries, etc. is low. Only small extractive sites occur commonly in wetlands, and these are very difficult to find in wet and thickly vegetated areas.

Disposal site A-3 is a five-acre lowland, herbaceous meadow lying at 585' to 590' a.s.l. (U.S. Army Corps of Engineers, 1977:33). Portions of this area have been filled. Other portions are lowlying and are vegetated by remnant wetland plants. Archaeological survey on this densely vegetated site may produce evidence of any potential cultural resources which have not been deeply buried by fill. If this site was poorly drained throughout the prehistoric and early historic periods, the potential for substantial human occupation is low. Because of fluctuating lake levels, A-3 would have been suitable for occupation only during low lake levels of the Chippewa-Stanley stage and during the post-glacial Lake Algoma and Lake Huron stages.

Disposal site A-4 is a nine-acre lowland meadow at 585' to 590' a.s.l., covered principally by wetland (shallow marsh) vegetation (U.S. Army Corps of Engineers, 1977:33). The wetlands have been reduced due to recent abnormally dry climatic conditions, and surface water occurs only on about ten percent of the land surface. Archaeological survey on the dry portions of the site is feasible and may produce evidence of any archaeological sites which have not been deeply buried by fill. Again, the predominance of poorly drained soil on this site throughout the prehistoric and early historic periods limits potential for substantial sites of human habitation.

Proposed disposal site L lies in Section 19. This site is an open meadow at 595' to 600' a.s.l., vegetated with grasses and forbs (U.S. Army Corps of Engineers, 1977:34). A sand ridge remnant of post-glacial Lake Algoma crosses the area, running SSW to NNE (See Fig. 1). Presently no major surface water sources occur within one mile of the study area, though prehistorically,

fluctuating lake levels would have brought lake water and marsh wetlands onto or in close proximity to site L. Between the Algonquin and Algoma lake stages when water levels dropped below 590' a.s.l., and during the post-glacial Algoma and Huron lake stages, the upper elevations of site L would have been drained and suitable for habitation. Any archaeological remains deposited prior to around 7,500 B.P. during the Paleo-Indian and Early Archaic cultural periods would have been washed and destroyed by rising lake waters of Lake Nipissing. After around 2,500 B.P., site L would have been exposed again for habitation. The sand ridge is likely to have been occupied briefly by Native Americans during seasons of resource harvesting in the adjacent lake, wetland and forest. Hundreds of small, prehistoric camp sites have been found on such sandy ridges throughout the Saginaw Basin.

Previous Archaeological Research

The State Archaeological Site File of the Division of the Great Lakes of the Museum of Anthropology, University of Michigan, records three sites within one mile of the proposed disposal sites A-1, A-3 and A-4, but no sites in or directly adjacent to these areas. The three previously reported sites are not included in, nor have they been nominated to, the National Register of Historic Places.

20-HU-16 (Sebewaing Village) is located in the SW¼ of Section 8, Sebewaing Township. This Native American site was reported by Harlan I. Smith in 1901.

> A camp or small village was situated on the south side of the Sebewaing River and back from the flood-land which here extends along the shore of Saginaw bay. It lay upon a low sand ridge near the first shaft of the Sebewaing Coal Company. Chipped points of chert, potsherds, and burned and crackled pebbles have been found in sufficient numbers to indicate the site (Smith, 1901:292).

20-HU-45 (Village) is located in the NW¼ of Section 18, Sebewaing

Township. This Native American settlement was reported in W.B. Hinsdale's 1931 atlas of archaeological sites in Michigan.

20-HU-46 (cemetery) is located in the center of Section 7 of Sebewaing Township on the north side of the Sebewaing River. This Native American cemetery was reported by Hinsdale (1931).

Since Hinsdale's research in the early part of the 20th century, Sebewaing Township has not been explored for archaeological sites. Sites reported by Smith and Hinsdale have not been relocated and their proveniences have not been confirmed. Because systematic archaeological survey has not been conducted in this part of the state, sites eligible for nomination to the National Register of Historic Places may occur which have not been previously discovered.

Published historic records and pioneer memoirs from Huron County do not record any additional information on aboriginal or Euro-American sites which may be impacted by projected contaminated dredged material disposal.

Conclusions and Recommendations

No archaeological sites have been previously reported within or directly adjacent to the four proposed disposal areas. In Section 7 of Sebewaing Township, archaeological potential for sites representing seasonal camps and resource extractive activity areas is generally high due to seasonally abundant marshland resources which are critical to many hunting and gathering subsistence economies. The predominance of wetlands in Section 7 throughout the prehistoric and early historic periods, limits greatly potential for large or seasonally sedentary settlements. In Section 19 of Sebewaing Township, archaeological potential for sites representing hunting camps and resource extractive activities is high especially on the well-drained beach ridge remnant of post-glacial Lake Algoma. This high potential is due to the site's seasonally

rich resource locality and dry elevation. Hundreds of small camps have been found on remnant beach ridges throughout the Saginaw Basin.

Because systematic survey has not been conducted in Sebewaing Township, archaeological survey should be conducted to confirm that sites previously reported in the area, are not on areas of projected impact and to seek any archaeological sites eligible for nomination to the National Register of Historic Places which have not been previously reported. Caution should be taken to guard against destruction of cultural resources either by excavation of soil in disposal site A-1 or deposition of excavated soil onto disposal sites A-3, A-4 and L by heavy earth-moving equipment. Archaeological survey to locate cultural materials is feasible in all portions of the proposed disposal sites except those portions presently under water.

References Cited

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Hi sdale, W.B.
1931 Archaeological Atlas of Michigan. Michigan Handbook Series, No. 4, University Museums, University of Michigan. Ann Arbor, Michigan: University of Michigan Press.

Kelley, R.W. and W.R. Farrand
1967 The Glacial Lakes Around Michigan. Michigan Geological Survey, Bulletin 4.

Smith, Harlan I.
1901 Summary of the Archaeology of Saginaw Valley. American Anthropologist 3:286-293.

U.S. Army Corps of Engineers
1977 Draft Environmental Statement: Sebewaing River, Michigan, Operation and Maintenance, Confined Disposal Facility and Flood Control Facilities. Detroit, Michigan

END

DATE
FILMED
12-81

DTIC