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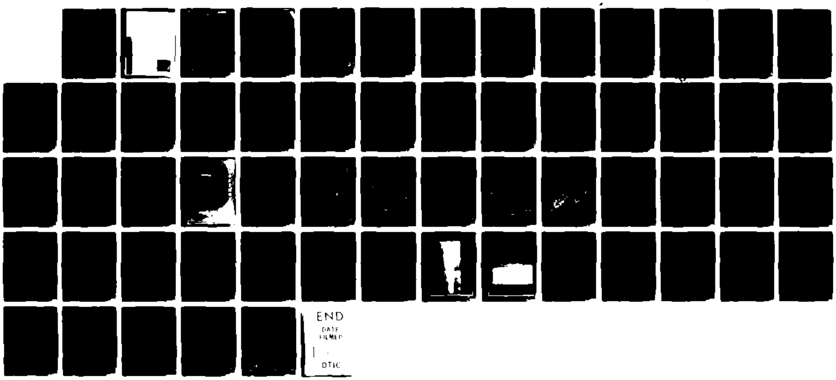

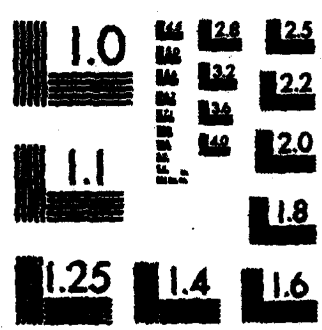

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The purpose of this report is to detail maintenance of Corps of Engineers structures in Saxon Harbor which maintain the harbor entry channel and inner basin and provide navigational safeguards. The two breakwaters are repaired by the cranebarge MARKUS which, in conjunction with tugs, tenders, and bottom dump scows, perform maintenance dredging in the area. Dredge material generated during construction of the harbor was used as fill for the breakwater cells or placed in a disposal area nearby. Beach nourishment has been used in the past, with open-lake disposal possible only when rough water conditions

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ENVIRONMENTAL ASSESSMENT REPORT
OPERATION AND MAINTENANCE
SAXON HARBOR, WISCONSIN
LAKE SUPERIOR

DEPARTMENT OF THE ARMY
1135 U.S. POST OFFICE AND CUSTOM HOUSE
ST. PAUL, MINNESOTA 55101
29 May 1975

ENVIRONMENTAL ASSESSMENT REPORT
OPERATION AND MAINTENANCE
SAXON HARBOR, WISCONSIN
LAKE SUPERIOR

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ENVIRONMENTAL ASSESSMENT REPORT
OPERATION AND MAINTENANCE
SAXON HARBOR, WISCONSIN
LAKE SUPERIOR

INTRODUCTION

The purpose of this statement is to discuss the environmental impacts associated with the St. Paul District Corps of Engineers harbor maintenance activities in Saxon Harbor. This assessment has been drawn largely from an environmental report prepared by National Biocentric, Inc., under contract with the Corps of Engineers. This report is on file in the St. Paul District Office.

1.00 PROJECT DESCRIPTION

Project Location

1.01 Saxon Harbor is located on the south shore of Lake Superior in the former mouth of Oronto Creek, approximately 1 mile west of the Wisconsin-Michigan border, in Saxon Township, Iron County, Wisconsin. The unincorporated village of Francis is located immediately west of the harbor. The harbor is located 25 miles east of Ashland, Wisconsin, and lies at 46° 35' north latitude and 90° 25' west longitude (see Exhibit 1, page A-1).

Project Purpose

1.02 Saxon Harbor functions exclusively as a recreational harbor-of-refuge for private recreational craft and charter trolling boats. In the past, the harbor was utilized by commercial fishermen, but this ceased in early 1961.

1.03 Harbors-of-refuge for small craft are defined as harbors developed primarily to afford shelter for vessels caught in unexpected storms and forced to seek refuge for the preservation of the vessel and the safety of the crew.

1.04 Proposed Action. The purpose of the Corps of Engineers structures in Saxon Harbor is to maintain the harbor entry channel and inner basin and to provide navigational safeguards. The principle operation and maintenance activities attendant to this end involve breakwater maintenance, dredging, and dredge material disposal (open-lake dumping and beach nourishment).

Project Authorization

1.05 The Saxon Harbor project was authorized by the River and Harbor Act, Public Law No. 500, 85th Congress, approved 3 July 1958.

1.06 On 16 October 1969, the Wisconsin Department of Natural Resources requested that the Corps of Engineers investigate shoreline erosion in the vicinity of Saxon Harbor. A shoreline erosion study was initiated by Michigan Technological University, Houghton, Michigan, under the authority of Section 111 of the River and Harbor Act of 1968, (Public Law 90-483), the first phase of which is scheduled to be completed in July 1975.

Existing Project

1.07 The Saxon Harbor project was an improvement of a partially completed Works Progress Administration (WPA) undertaking begun in 1939 and terminated with the cessation of Federal assistance in 1942. Initial Corps activity was authorized in 1958; construction began in fiscal year 1965 and was completed, except for minor work, the following fiscal year.

1.08 Corps activities in Saxon Harbor have been directed at modifying an existing harbor by diverting Oronto Creek, which flowed through the harbor, approximately 370 feet to the east to join Parkers Creek which enters Lake Superior just east of the existing harbor. A two-dimensional sheet pile nozzle constricts the flow of the two creeks as they enter Lake Superior. The Corps also constructed a 1,175-foot dike between Oronto Creek and the harbor.

1.09 In addition, the Corps constructed two breakwaters, an outer channel, and an inner harbor basin. The west breakwater consists of 381 feet of steel sheet piling that projects 8 feet above the normal lake level. The west breakwater ends in one 35-foot wide steel cell. The cell, constructed of steel sheet piling, is filled with sand dredged from the harbor and capped with 2 feet of rock and concrete. The east breakwater consists of a 335-foot long stone mound on the land end connected to a 280-foot cellular breakwater on the lake end. The stone portion has a small rock core covered with larger stones and capped with a layer 6 feet thick of 3- to 5-ton boulders. The stone portion is of an inverted "V" configuration 8 feet wide at the top. The entire section projects 8 feet above the normal lake level. The end 280 feet of the east breakwater consists of seven steel cells of similar construction to the cell on the west breakwater. Stone protection repairs were made in 1972 when 1,033 tons of rock were placed at the east breakwater. Both breakwaters are equipped with U.S. Coast Guard navigational aid lights at the outer ends. The 10-foot deep outer channel narrows from 100 feet at its outer extremity 80 feet at the entrance to the inner basin. The irregularly-shaped inner basin is approximately 95 feet wide, 350 feet long and 8 feet deep with a side channel 50 feet wide, 450 feet long, and 8 feet deep (see Exhibit 2).

Improvement by Others.

1.10 Iron County maintains 34 slips within the harbor for seasonal rental. They consist of finger piers extending from the sides of the inner harbor. There is also a small dock on the east side of the inner harbor reserved for transient recreational craft. Adjacent to the dock is a boat-launching ramp. Restrooms and potable water are available at the harbor. The county installed pump-out facilities in the fall of 1974. The county has a full-time park ranger during the boating season.

Future Structures

1.11 The Corps of Engineers project at Saxon Harbor is currently under study because of erosion problems west of the harbor. As of April, 1975, the Corps has no plans for further project-related construction at the harbor.

1.12 The feasibility of constructing a drop structure for erosion control on Oronto Creek is presently being evaluated by the United States Soil Conservation Service. If constructed, this project will be funded by the Environmental Protection Agency and Iron County under the Western Lake Superior Basin Erosion and Sedimentation Control Program. Design details are unavailable at this time.

Operation and Maintenance

1.13 The purpose of the Corps of Engineers structures in Saxon Harbor is to maintain the harbor entry channel and inner basin and to provide navigational safeguards (see Exhibit 3, Operational History).

1.14 Breakwater Maintenance. Corps of Engineers structures at Saxon Harbor consist of two breakwaters. The cranebarge MARKUS attended by the tug DULUTH and the tender FAIRCHILD are the usual complement of equipment used to repair the Saxon Harbor breakwaters. The MARKUS is used to transport repair equipment and supplies, and can be equipped with a mechanical rock grapple for hoisting, moving and placing 3- to 10-ton boulders at the repair site. Maintenance consists primarily of replacing rock torn from the harbor breakwaters during Lake Superior storms.

1.15 Dredging. Maintenance dredging in the harbor is presently performed by the MARKUS in conjunction with tugs, tenders, and bottom dump scows. Corps of Engineers maintenance activities have removed a total of 61,350 cubic yards of sand, gravel, cobblestone, and some silt sediments from the harbor area.

1.16 The estimated average annual maintenance dredging required to maintain project depths is approximately 6,000 cubic yards based on a 3-year frequency of dredging. The amount of maintenance dredging required varies from year to year depending on sediment movement and deposition resulting from storm and wave action. Strong on-shore winds at Saxon Harbor often push clay and silt-laden waters into the harbor which accounts for the high percentage of fine sediment in both the dredged and undredged portions of the harbor.

Dredge Material Disposal

1.17 During dredging operations, dredge materials are placed by the clamshell dredge into bottom dump scows for removal from the dredge site to the disposal areas.

1.18 Dredge material generated during the construction of Saxon Harbor was used as fill for the breakwater cells or disposed of on-land in a disposal area bounded by the levee on the north, the access road to the village of Francis to the west, and Oronto Creek on the south (See Exhibit 3).

1.19 Sampling and analysis by the Environmental Protection Agency in February, 1975, reclassified the harbor non-polluted; therefore, either beach nourishment (replacement of sand and gravel eroded by waves and currents) or open-water disposal will be utilized.

1.20 Beach Nourishment. Beach nourishment with dredged material has been used in the past at Saxon Harbor. A total of 15,525 cubic yards has been deposited as close to shore as possible in eroding areas west of the harbor. Since the harbor has recently been reclassified as non-polluted, beach nourishment would be the preferred way of disposing of dredged material. Cost wise, this method represents one of the most economically feasible methods. Because of the present high lake levels and the soil type (red-clay) west of the harbor, beach nourishment will probably not be of any long-term value in stopping erosion.

1.21 Open-Lake Disposal. Open-lake disposal has been practiced at Saxon Harbor only when rough water conditions make it impossible to dump dredge material near shore for beach nourishment. The dredge material is transported via bottom dump scow to the open lake dumping site. The site is located 45° from the pierhead of the east breakwater in 50 feet or greater of water depth.

1.22 Saxon Harbor is presently classified by the Environmental Protection Agency (EPA) as nonpolluted. On-land disposal of dredge material has been utilized as fill material in the park area. This does not preclude lake dumping at a later date.

2.00 ENVIRONMENTAL SETTING

Geographic Setting.

2.01 Oronto Bay is defined by Marble Point to the west and Little Girls Point to the east. The harbor occupies the former drowned mouth of Oronto Creek (Exhibit 5). During the construction of the harbor, Oronto Creek was diverted approximately 375 feet to the east into Parkers Creek. With the diversion, Oronto Creek has become a man-made tributary of Parkers Creek. Saxon Harbor is situated on the eastern margin of the Lake Superior lowland.

Physical Environment

2.02 Climate. Saxon Harbor experiences the typical humid continental climate of the Lake Superior Basin, characterized by cold, dry winters and warm, humid summers. The average January and July temperatures are 14° F and 66° F, respectively. The minimum and maximum recorded temperatures were -45° F and 104° F. The mean number of days per year with temperatures below zero is 35 days. Summer temperatures rarely rise above 90° F.

2.03 The mean annual precipitation is 32.5 inches with maximum and minimum precipitation occurring in June (4.8 inches) and February (1.3 inches). Precipitation usually occurs in moderate amounts with .50 inches or more of moisture falling an average of 22 days. Annual snowfall amount averages about 100 inches.

2.04 Prevailing winds are westerly. Frequent onshore winds particularly from the north or southeast can create waves that cause unsafe harbor conditions. Wind velocity can exceed 30 miles per hour (mph) an average of 30 days out of each summer's 5-month (May to September) small craft boating season. Storms accompanied by high winds blow up quickly, particularly in the spring and fall.

2.05 Changes in atmospheric pressure accompanying the passage of cyclonic fronts over the lake sometimes generate seiches, (rapid fluctuations in lake levels). A seiche may result in a drop or increase of the prevailing lake level a foot or more in a matter of a few moments along the south shore of Lake Superior.

2.06 Geology. The present-day shoreline of Lake Superior was shaped largely during the Great Ice Age, which extended from a few hundred thousand years ago to several thousand years ago. During this period, successive ice sheets advanced and retreated over the area, filling valleys, gouging out lakes, and forming ridges and hills. The western portion of the Lake Superior Basin, the area in which Saxon Harbor is located, was a graben (a depression in the earth's crust) filled with sandstone and shale-derived sediments at the advent of the continental glaciation. The resistant sides of the trough (the present Minnesota shore, the Keweenaw Peninsula, and the Bayfield Peninsula) controlled the direction of the advancing ice front, and the less resistant sediments were scoured out.

2.07 As the glacier retreated, a high terminal moraine associated with high ground on the Minnesota and Michigan sides allowed a glacial lake to develop. The highest beach of glacial lake Duluth is at elevation 1105 feet, about 5 miles south of what is now Saxon Harbor. During the Duluth and Algonquin stages, glacial lake bottom sediments were built up in the area surrounding and including Saxon Harbor. With the lowering of the lake level to Nipissing stage, and finally to the present Lake Superior level, erosion attacked these soft sediments, resulting in essentially the same land forms and shorelines visible today.

2.08 Topography and Soils. Resistant material composes the tilted sandstone ledge forming Marble Point. This point controls the position of the northwesterly end of the nearly straight shoreline extending back to Saxon Harbor. The bedded sands, silts, and clays behind this shore are deeply cut by ravines and small streams.

2.09 The glacial lake sediments are generally not as thick along the shore from the Montreal River northeastward to Little Girls Point. This is due to bedrock which is closer to the surface. As a consequence, the streams do not cut as deep in this area because they are controlled by the bedrock. The section from the Montreal River to Saxon Harbor is transitional. That is, near the Montreal River, the shore features are more nearly like those to the northeast, as described above. Nearer to Saxon Harbor, the ravines become deeper, more like those between the harbor and Marble Point. This transition is caused by the gradual disappearance of the sandstone with increasing distance westward from the mouth of the Montreal River.

2.10 In particular, at this site the shoreline is protected by rock outcrops to a point one-half mile west of the mouth of the Montreal River. The rock is a steeply dipping formation of fine-grained sandstone with occasional darker shale layers. Due to normal weathering, such as freeze-thaw cycles, the rock erodes by spalling along bedding planes and falling into the lake. The resulting bottom material is composed of platy, well-rounded cobbles or shingles. To the west, the soil bluffs dominate and a narrow beach grading from shingles to sand moving westward develops.

2.11 Except for a small area just west of the harbor, there is a conspicuous absence of thin beds of alternating sand, silt, and clay in some combination. The bluff profile is characterized as a massive nonplastic tan silt deposit 30 to 80 feet high, capped by up to 20 feet of highly plastic red clay. Except for small very localized pockets of fine sand, there is no material on the bluffs which would remain on or near the beach if periodic bluff collapses occur. Moving west of the harbor, the beach and near-shore area of the lake contains a decreasing amount of shingles until finally only an occasional rock is visible on the shore and bottom which is composed of fine to medium sand.

2.12 Three significant rivers enter Lake Superior in the harbor area. Proceeding east to west they are, the Montreal River, Parkers Creek, and Oronto Creek.

Hydrologic Environment

2.13 Surface Water. Surface drainage in the area is provided by a series of relatively short streams which have their headwaters in the glacial margin a few miles to the south and about 400 feet above the elevation of Lake Superior. In a 3-mile stretch westward from Parkers Creek, six streams enter the lake. The streams have narrow interfluves and follow deeply incised paths through the unconsolidated glacial till.

2.14 Groundwater. Groundwater at the Saxon Harbor site occurs in both the surfacial deposit of unconsolidated clays and glacial sediments and in the underlying Precambrian sandstone, shale and conglomerate bedrock units. The lake clays and glacial sediments have a combined thickness of about 100 feet. Wells in this deposit must be developed in sandy phases of the glacial sediments. These water-bearing horizons have an irregular distribution and are unreliable for more than small domestic water supplies. The bedrock aquifer is more reliable, but sustained yields in excess of 50 gallons per minute may be obtained only from deep wells. The harbor is in a groundwater discharge area that is fed from a much higher water table to the south. Therefore, some artesian pressure may be expected in most wells. The water quality varies throughout the area ranging from moderately hard to hard, with moderate to objectionable qualities of dissolved solids and chloride. Nitrate pollution of the groundwater is not a problem. (Water Resources of the Wisconsin Lake Superior Basin, U.S. Geological Survey, 1974.)

2.15 Lake Water Quality. The eutrophication process in Lake Superior is apparently progressing at an extremely slow rate as dictated by nature, with little or no alteration by human activity. Therefore, the measured changes in water quality are misleading when viewed from the eutrophication standpoint alone. The effects of human activity on Lake Superior could be more readily seen in the examination of other chemical and physical parameters.

2.16 The introduction of halogenated and chlorinated hydrocarbons into the lake is recent and a result of human activities. At present, there is virtually no information on the levels of these compounds in Lake Superior. Measurement of these parameters is important because of the deleterious effects of the parent or breakdown products. The presence of taconite tailings, and asbestos-like materials are acknowledged although their effects are still undetermined.

2.17 Lake Superior, the dominating body of surface water in the area, is characterized by soft water. Hardness is approximately 44 ppm CaCo3. The pH is approximately 7.5. Water temperatures in Lake Superior fluctuate slightly, ranging in the 40's most of the year.

2.18 Shipping has been responsible for some water quality degradation in the open waters and harbor areas of Lake Superior. Oil discharges, bilge wastes and garbage from commercial vessels plying the lake have created occasional problems. Gasoline, oil, and refuse from recreational craft have added to the problem. However, enforcement programs have become more stringent in recent years, and the problem is not considered acute.

2.19 The water quality generalizations made for the open lake are appropriate for most of the inshore waters. The widespread indications of change and deterioration observable in the inshore waters of the other Great Lakes are, for the most part, not apparent in Lake Superior.

2.20 Harbor Water Quality. Saxon Harbor can now be described as a "pocket harbor." It is a pocket harbor in that it has no rivers or creeks flowing through it into Lake Superior. The sediments in Saxon Harbor originate from the natural shoreline on this part of the lake and are influenced primarily by wave action, boat traffic in and out of the harbor, and a predominant east to west littoral drift. In an aerial photograph taken during the spring breakup, it was observed that the sediment plume from Parkers Creek and Oronto Creek penetrated the rubble-mound portion of the east breakwater. This could be a sediment source because passage of fine sediments entering the harbor in this manner would be interrupted by the west breakwater which is constructed of steel sheet pilings.

2.21 In order to permit comparison between and within specific areas of the harbor, the harbor was arbitrarily subdivided into four zones (Exhibit 6, Sediment and Water Sampling Data). Zone I, which represents the inner portion of the harbor, is the mooring area for recreational boats using Saxon Harbor. The boat traffic and mooring activity contribute both oil and grease to the water. These materials can readily be chemically bonded to the fine clay particles which are present in the bottom sediments. Zone II is that part of the project area which is located outside of the natural shoreline in Saxon Harbor. This area is influenced by boat traffic and by the wave action of Lake Superior. Zone III is an area inside of the harbor that is not part of the project area. Zone III is bordered by the breakwater on the west side, the natural shoreline on the south, and the project area on the east. This is a shallow area and is not used by boats moving in and out of the harbor. The bottom sediments in this area represent an undisturbed area inside of the harbor. Zone IV is an area located outside of Saxon Harbor near the harbor entry.

2.22 In September of 1968, the Environmental Protection Agency (EPA), sampled Saxon Harbor for chemical constituents and concluded that the harbor was polluted. The analysis of samples indicated that levels of total kjeldahl nitrogen (TKN), total volatile solids (TVS), oil and grease, chemical oxygen demand (COD), lead (Pb), and zinc (Zn) were in excess of EPA guidelines. Subsequent evaluation of Saxon Harbor by the EPA resulted in the reclassification of the harbor as nonpolluted.

Biological Environment.

2.23 General. Much of the land along the south shore of Lake Superior was originally covered with boreal forests. The forests were primarily northern hardwoods with the dominant species being sugar maple, yellow birch, basswood, ironwood, northern red oak and elm. On the sandier and drier soils were occasional pure strands of pine, with white pine perhaps the most prevalent.

2.24 The vegetation of the Lake Superior lowland is now a mixture of forest types, both coniferous and deciduous. Most of the forests were logged over in the late 1800's and were later used for agricultural purposes. Because many farms were abandoned due to unfavorable climatic and soil conditions, the land reverted to forest, with aspen becoming a dominant species. Today, Iron County, one of the most extensively forested counties in Wisconsin, has over 400,000 acres of commercial forest land, over half of which is publicly owned.

2.25 Terrestial Vegetation. In the Saxon area the more xeric (dry) forest stands vary from nearly pure pine to mixtures of conifers and hardwoods. In the latter, red maple, quaking aspen, and paper birch are frequently present. Shrubs often include hazel, bearberry, blueberry and sweet-fern. Herbs include spreading dogbane, columbine, sarsaparilla, strawberry, bunchberry and several others. Bracken fern and several species of sedges and grasses are often present.

2.26 The area surrounding the harbor is heavily wooded with considerable second growth aspen, paper and yellow birch, and various maples. This cover extends to the edges of the bluffs and areas of active erosion are quite obvious from the collections of still-living, but uprooted, trees at the base of the bluffs in these locations (see Exhibit 7).

2.27 Wildlife. The wildlife resources of the area provide many hunters, photographers, and wildlife observers with recreation. A wide variety of game is available, most important of which are the black bear and the white-tailed deer.

2.28 The south shore of Lake Superior is a composite of beaches, marshlands, and upland forests. These areas provide habitat for a diversity of game fish and wildlife species. The aquatic environment and adjacent lands provide food and shelter for many species of waterfowl, shorebirds, songbirds, birds of prey and upland game birds. Among the more common mammals are white-tailed deer, black bears, coyotes, foxes, skunks, porcupines, squirrels, and mice. Smaller forms of fauna are common garter snakes, turtles, frogs, toads and salamanders. Many species of songbirds nest in the shrubs and trees.

2.29 Saxon Harbor was sampled for benthic organisms by National Biocentric, Inc. The resultant data is included in Exhibit 6, table A-4.

2.30 The fish inhabiting Parkers and Oronto Creeks are primarily rough fish. There is a sizeable brown trout spawning run into Oronto Creek during the fall. Brown and rainbow trout are caught within and around the Corps project. Lake trout are caught in the harbor and from the breakwater as well as offshore. Most of the offshore recreational fishing is in pursuit of lake trout.

2.31 Threatened and Endangered Species. A check with the Wisconsin Department of Natural Resources and the U.S. Fish and Wildlife Service has failed to disclose the existence of threatened or endangered species permanently residing in or around the harbor area. Bald eagles are infrequent visitors to the Lake Superior shoreline in the vicinity of Saxon Harbor. All of the known nesting sites in the Saxon Harbor area are inland from Lake Superior. No known threatened or endangered species will be affected by the continued operation and maintenance of Saxon Harbor.

Socioeconomic Environment.

2.32 Historical and Archaeological Investigations. In compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, the National Register of Historic Places has been consulted and as of 6 May 1975, no sites are listed which would be affected by the continued operation and maintenance of Saxon Harbor. In addition, coordination with the National Park Service and the Wisconsin State Historic Preservations Officer has been initiated. (See Exhibits 12 and 13.) It is unlikely that any potential sites should be affected. However, an archaeological survey will be conducted and should any information to the contrary come to our attention either during review of this environmental assessment report or at a later date, compliance with the above-stated regulations would continue.

2.33 Historic Background. For a 10-year period, 1945-1954, Saxon Harbor was utilized by commercial fishermen. The landed catch averaged 44 tons annually. Commercial fishing activity began to taper off after 1956, reaching zero in 1962. Since 1962, the harbor has served exclusively as a recreational harbor-of-refuge.

2.34 The economic base of the town of Saxon has historically depended on iron mining. Saxon is located near the east end of the Penokee-Gogebic Iron Range. The last two mines to operate in the region, the Cory and the Montreal, were opened in 1885. Iron was shipped by rail to Ashland, Wisconsin, for loading onto lake carriers. The last mine operated closed in 1965. Extensive deposits of low-grade ore (taconite) remain in the county, and redevelopment of mining in Iron County is a possibility, utilizing modern technology to improve the ore.

2.35 Logging and farming were also important industries in past years, but both industries have declined in recent years. Manufacturing is currently the major source of employment for residents of Saxon Township, with the majority of workers commuting to nearby cities such as Ashland or Hurley, Wisconsin, or Ironwood or White Pine, Michigan, for employment.

2.36 Social Characteristics. The village of Francis is located adjacent to Saxon Harbor. Francis has no known year-round residents. The village does not have a governing body and no facilities are located there other than one tavern which is only operated seasonally. There is a park ranger stationed at the harbor during the summer.

2.37 The harbor is more frequently associated with Saxon, located 5 miles south of the harbor. Saxon Township with a population of 371 persons in 1971, encompasses the harbor and the village of Francis.

2.38 Saxon's population in 1960 was 483 so the 1971 population represents a 10-year decline of 23.2 percent. The unemployment rate in 1970 was 9.5 percent, considerably higher than the national average. Median income of families was $6,000 in that year, with 19.6 percent of families having an income below the poverty level. Some 6.9 percent of families had income in 1970 of $15,000 or more.

2.39 Transportation. U.S. Highway 2 passes about one-half mile south of Saxon. This highway connects directly with Ashland to the west and the Hurley-Ironwood area to the east. Wisconsin Highway 122 originates at Saxon Harbor and runs through Saxon to its southern terminus at Upson. The Chicago and Northwestern Railway and Soo Line Railroad pass through Saxon, but regular stops are no longer scheduled. Freight service is available at Ashland and Ironwood, Michigan. Airports are located at Ironwood and Ashland with scheduled flights made from both places.

Future Environmental Setting without the Project.

2.40 Without a maintained project, wind produced waves would continue to move sediments into the harbor. Eventually shoaling would render the harbor inaccessible to small craft and its function as a harbor-of-refuge would be lost. Storm generated waves could, in time, destroy the breakwater structures. Without the breakwaters, the buildup of rock materials east of the harbor could be carried by littoral currents and spring runoff in a westerly direction. In view of the soil composition of the eroding shoreline and present high water levels in Lake Superior, it is doubtful that the rock material would significantly contribute to abatement of the erosion.

2.41 The absence of this small craft harbor-of-refuge would not have any serious economic effects. The cessation of maintenance of this harbor would eventually result in one less access point to Lake Superior for fishermen and boaters. Those persons who moor their boats in Saxon Harbor would have to find an alternate site.

2.42 Without the existence of Saxon Harbor, the series of strategically spaced harbors-of-refuge along Wisconsin's Lake Superior shoreline would be interrupted.

2.43 The harbors-of-refuge are located at intervals of 30 to 40 miles. The average small craft is assumed to have a safe cruising distance of 30 miles, which was the determining factor for the spacing of the harbors-of-refuge.

3.00 RELATIONSHIP OF THE HARBOR TO FUTURE LAND USE

3.01 The Corps of Engineers periodic dredging and breakwater maintenance of Saxon Harbor, insures its function as a recreational harbor-of-refuge. In past years, the harbor was also utilized by commercial fishermen. In addition to private recreational craft, charter boats use the harbor.

3.02 The area adjacent to Saxon Harbor is maintained as a park by Iron County. The county currently has plans for expanding the picnic area and improving the existing facilities for overnight camping.

3.03 On 29 April 1975, Iron County applied to the Corps of Engineers for a permit to modify the existing boat launching ramp and to construct a pier alongside of it. The modification of the ramp involves reducing the grade for easier launching of boats. The new pier will facilitate easier loading and unloading of boats. No action has been taken on the permit application at this time.

4.00 IMPACT OF THE PROPOSED ACTION

4.01 General. Equipment used in maintaining Lake Superior harbors utilized approximately 10,000 gallons of fuel during a typical 200-day operating season. The amount of fuel consumed while at Saxon Harbor is a very small percentage of this total. Maintenance work is conducted as necessary.

4.02 Certain amounts of lubricating oil and grease may reach the water directly as a result of equipment submersion. Reasonable care is maintained to prevent oil and grease from entering the water, however, temporary oil slicks may occur in the vicinity of operating equipment. A floating oil boom is stored at the Fountain City Boat Yard, Fountain City, Wisconsin. This unit is packaged and ready to be transported to any Lake Superior or Mississippi River site, in the event of an accidental oil spill.

4.03 Short-term impacts to air quality may result as diesel exhaust from the motors aboard the MARKUS, tug and tenders must be vented into the open air.

Impacts of Breakwater Maintenance.

4.04 Noise. Temporary increases in noise levels are associated with the operation of motors, pistons, winches, etc. Little of the noise associated with the equipment is audible beyond a 100-yard distance.

4.05 Activity Related Congestion. Breakwater repair may cause temporary blockage of the harbor entry. Such activity is of a short-term nature and has no long-term effects.

4.06 Biological. Breakwaters along a relatively unsheltered coastline provide a relatively calm and sheltered habitat for species which would normally not be found in this area. Increases in plankton and benthic species can be expected in areas of reduced wave force. As the habitat and nutrient levels increase, there may also occur increases in the numbers of fish population and existence of the breakwaters as a platform for offshore fishing without a boat.

4.07 Chemical Impacts. The potential chemical impacts of structures in Saxon Harbor have been investigated. Although the potential for long-term leaching of inorganic constituents from the structures exists, the potential impacts of this material are considered to be minimal. It is anticipated that this impact will be similar to the normal erosion and leaching of native rock shorelines at other points along Lake Superior.

4.08 Current and Wave Alteration. The effect of the two-dimensional steel sheet nozzle which was built to constrict the combined flow of Oronto and Parkers creeks where they enter Lake Superior, just east of the harbor, was based on the principle that the increase in pressure would keep the creek channel open.

The mouth of the two creeks has been plagued by channel blockage. The beach just east of the harbor has increased 88 feet since 1944. The steel sheet piling did not alleviate the problem. The creek's mouth periodically requires dredging to remove a conglomerate of glacial till and trees carried downstream during the spring runoff or high-water periods. Total blockage of the mouth of the creek caused Oronto and Parkers creeks to overflow their banks in the spring of 1972. This caused an estimated $30,000 to $50,000 damage to public and private property.

4.09 The blocking of the creeks' mouth has had adverse biological consequences. Oronto and Parkers creeks are the site of a brown trout spawning run during the fall. If the streams are blocked the trout cannot enter the streams to spawn. This does not pose a threat of flooding during the fall because the streams are at a low level and the water reaches the lake by filtering through the cobbles. In the past, Iron County has reopened the creeks' mouth during the spawning run. The most recent action during the fall of 1974 resulted in the stream being open only for a couple of days. A storm from the northeast soon closed the opening (see Exhibit 8). Storms from the northeast are common during this time of the year. It costs the county $500.00 each time the creeks' mouth is cleared. The county's budget is too limited to do this on a regular basis.

4.10 A 600-foot reach of shoreline west of the harbor has been affected by severe erosion. The erosion area is composed of high bluffs whose profile is characterized by a massive tan silt deposit 30 to 80 feet high capped by 20 feet of highly plastic red clay (see Exhibit 7). The red clay soils are geologically young with soil erosion processes occurring at a rapid rate. The Red Clay Interagency Committee characterizes these soils as being unstable, highly erodible and subject to slippage, particularly along stream and lakeshore banks, roads and field gullies. The apparent pattern of erosion is one of removal of the silt by wave action and/or precipitation followed by collapse of the clay cap. The clay then slides over the silt, temporarily covering it, and comes to rest as a spreading mass in the lake. Within a few days to a few months the wave action has removed this debris and commences to erode the silt again in a repeating cycle. The quantity of sediment washed from the bluffs colors the littoral waters a reddish-brown and when a strong northwest wind blows, turbid waters are blown into the harbor.

4.11 Several interrelated factors appear to be causing the erosion. First, the construction of longer breakwater piers in the 1940's has apparently cut off the natural littoral transport of shore-building materials from the east side to the west side of the harbor. This is evidenced by a buildup of gravel and cobble beaches on the east side of the harbor and little if any on the west side. High Lake Superior water levels since 1968 have further aggravated the problem as a result of wave action attacking previously unexposed beach and banks. Hydraulic studies and visual observations have shown that incoming northwesterly waves are reflected from the west breakwater onto the shore just west of the breakwater. The abrasive action of ice against the shoreline of Lake Superior during the spring breakup further aids the erosion process. These factors, in addition to easily erodible soil types, have resulted in a relatively high rate of erosion (see Exhibit 9).

Impacts of Dredging

4.12 Turbidity. Dredging creates a certain amount of temporary turbidity (muddied or sediment clouded water).

4.13 Dredging redistributes and resuspends the finer sediment material found at the sediment-water interface. This fine material settles out and redeposits in adjacent areas after dredging has ceased. Therefore, the layer of fine, easily disturbed sediments may be greater in the adjacent undredged areas representing the original state plus some of the material stirred up by dredging.

4.14 The amount of turbidity is related in part to the nature of the bottom sediments being dredged. Sand and gravel create relatively little turbidity, while clay and light organic "muck" will create more turbidity. The "plume" of dredge induced turbidity is of a relatively small extent and short duration compared to the extensive and long lasting turbidity clouds created by on-shore storm waves.

4.15 The most obvious effect is a reduction of light penetration into the water. Reduction in light penetration of relatively short duration will have relatively little effect upon the light requirements of sensitive organisms.

4.16 More subtle effects (and therefore more difficult to accurately determine) are those produced upon aquatic life and water quality in the area of the operating equipment. Turbidity clouds and associated release of oxygen consuming nutrients, especially where dredging of organic sediments is being conducted, can be expected to reduce the dissolved oxygen level of the surrounding water, temporarily driving off fish.

4.17 Turbidity directly effects resuspension and redistribution and indirectly effects oxidation or reduction of various chemicals. Many of these substances may be toxic to life forms, although it is as yet not fully known to what extent turbidity caused by dredging influences toxicity concentrations.

4.18 Water Contamination. The tug DULUTH associated with the MARKUS is equipped with sanitary holding tanks for containment of onboard generated wastes. A certain amount of water quality impairment exists as a result of dredging induced turbidity as discussed above.

4.19 Noise. Noise associated with the operation of the dredge is very substantial. The use of large mechanical equipment results in noise associated with the motors, with winches, and the raising and lowering of the dredge bucket.

4.20 Activity Related Congestion. Dredging results in the location of a dredge, scow, barge, and other large pieces of equipment directly in the basin or channel. It presents a navigational obstacle by the mere presence of large stationary vessels.

4.21 Chemicals. As noted, previous to October 1974, EPA had classified Saxon Harbor polluted. Dredging with its concomitant disturbance of bottom sediments, causes a resuspension of fine particles as discussed in paragraphs 4.12 and 4.13, Turbidity.

4.22 In addition to resuspending physical particles, dredge-induced turbulence also brings soluble chemicals from the sediments into solution in the water. In warmer and more eutrophic waters, this addition of nutrients and chemicals may have a direct impact in causing temporary algae blooms. In the colder Lake Superior waters, however, algae blooms have not been observed. The increased concentration of available nutrients would be expected to support large plankton populations but not to the extent that nuisance blooms would occur.

4.23 The introduction of chemicals into solution is considered to be one of the unavoidable acts of dredging and utilizing currently available equipment.

4.24 Habitat Alteration. If a totally new environment (habitat) were exposed by dredging, a different benthic community would be expected to develop. The new dredging involves exposure of sediments which have not been exposed to the aquatic environment. This might occur when new harbor areas are dredged.

4.25 The rate at which a benthic community reaches equilibrium after dredging operations has not been documented. Organisms may, in fact, return relatively rapidly, but the symbiotic relationships between various species suggest that a transitional benthic community will be established shortly after dredging and that it will take a long period of years (without disturbances) before a stable benthic community reestablishes itself. This would not be possible within a Corps project area which requires periodic dredging.

4.26 Organic Matter Removal. The material at the sediment-water interface is frequently high in both organic and chemical components. Removal of the organic material by dredging is expected to reduce the oxygen demand on the water at the interface. The waters of Lake Superior are normally high in dissolved oxygen throughout the year. It is unlikely that changes in the oxygen demand of areas in the Saxon Harbor will have a significant impact on fish habitat.

Probable Impact of Confined Disposal

4.27 Diked, confined or on-land disposal of dredged sediment had been ordered for Saxon Harbor as a result of the polluted classification of the bottom sediments. Exhibit 4 denotes the proposed disposal sites. The harbor has since been reclassified as nonpolluted and open lake disposal of dredged material and beach nourishment probably will be followed.

Probable Impacts of Open-Lake Disposal.

4.28 Biological Impacts. Open-lake disposal, with its accompanying resuspension of sediment material, would increase the concentration in the water of whatever chemicals are found in the dredged sediment, possibly resulting in a detrimental effect on the water quality in the disposal areas. The resuspension of chemicals and deposition of dredged sediments would have an adverse impact if dumped in the vicinity of fish spawning areas. Of particular significance is the Red Clay Interagency warning that, "clay sediments deposited in beds of streams and lakes may destroy spawning areas...and may capture and store organic wastes, toxic materials, and nutrients." Nutrients released in the water as a result of dredged material disposal may, on the other hand, spur an increase of planktonic growth which in turn attracts fish.

4.29 An additional impact of open-lake disposal would be the burial, en masse, of benthic organisms under the load of deposited material.

4.30 Beach Nourishment. Beach nourishment would effect utilization of the sand, gravel, and stone dredged from the harbor in a practical manner, representing a recycling of a valuable natural resource. However, as the dredged material would be dumped just offshore at a depth of approximately 8 feet, the impacts of this disposal method would be much the same as those of open-lake disposal.

Socioeconomic Impact Related to Operation and Maintenance Activities.

4.31 Saxon Harbor is used extensively for recreational purposes. The harbor presently is used by private recreational craft and charter trolling boats. The operation and maintenance activity of the Corps of Engineers makes possible a number of commercial and residential activities. Iron County obtains revenue from those who use the harbor. There are two taverns located near the harbor. One of which serves food. Apparently, a substantial portion of the sales of these two operations is derived from people coming to use the harbor.

5.00 UNAVOIDABLE ADVERSE EFFECTS

5.01 Dredging. The physical act of digging a hole in the harbor bottom, under water, causes several unavoidable effects, the most common of which is turbidity. For example, clouds of sediment are released to the water every time the dredge bucket or clam-shell digs into, disturbs and removes a portion of the bottom sediments. Turbidity also results from overflowing and leaking dredge buckets, clam-shells, and dump scows, and is produced when equipment and scows are cleaned by flushing sand, mud, silt, and organic material off the decks of operating equipment with jets of water from high-pressure hoses. (Turbidity is discussed in paragraphs 4.12-4.17.)

5.02 Breakwater Maintenance. The unavoidable impacts of breakwater maintenance and the physical presence of the breakwater are discussed in paragraphs 4.04-4.06.

5.03 Beach Nourishment and Open-Lake Disposal. The unavoidable impacts associated with beach nourishment and open-lake disposal are essentially the same (see paragraphs 4.28-4.30).

6.00 ALTERNATIVES TO THE PROPOSED ACTION

Disposal Alternatives

6.01 Road Construction Materials. Dredged materials can be made available to be utilized as materials for construction and maintenance of highways by Iron County. Past experience of the Corps of Engineers has shown that when dredged material is made available for construction purposes, it is rapidly used by the local municipalities.

6.02 On-Land Disposal. Prior to the 1974 reclassification of Saxon Harbor, as nonpolluted, two on-land disposal sites had been proposed.

6.03 The initial on-land disposal site is located approximately 1/4 mile from the unloading zone (see Exhibit 4). This site could hold approximately 10,000 cubic yards of dredged material. The second site is located northwest of the initial site and has a capacity for approximately 5,000 cubic yards. Both sites are low areas. Iron County owns the property.

6.04 The present plans for disposal of dredged material from Saxon Harbor does not include on-land disposal. On-land disposal would have to be funded by Iron County.

6.05 No Project Alternative. Without a maintained project, storm generated waves and longshore currents will continue to redeposit sand, gravel, and cobbles in the harbor entry, eventually blocking it. Although these processes would be slow to occur, eventually the loss of the breakwaters and harbor entry shoaling would close the harbor. No project would result in the loss of boat docking and marina facilities. It would put two charter boat operators out of business, and it would eliminate a necessary small craft harbor-of-refuge along Wisconsin's south shore.

7.00 RELATIONSHIP BETWEEN SHORT-TERM USES OF NATURAL ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

7.01 Army Corps of Engineers maintenance activities in Saxon Harbor are conducted by congressional authority in response to expressed and implied public need for continued small craft navigation and safety requirements within the project area. Breakwater repair and inner basin dredging is performed on a periodic basis as needed, in response to changing harbor use patterns and in response to storm-generated breakwater damage and basin shoaling.

7.02 In pursuit of the requirements for harbor maintenance, some localized short-term expenditures of funds, manpower, and natural resources have occurred. Localized short-term disruptions of the benthic biological community have occurred, however, no apparent long-term damage to any ecosystem has resulted from past Corps dredging or structure maintenance within the harbor. However the breakwater structures may be a contributing factor to the shoreline erosion west of the harbor. Future maintenance dredging and structure repair if conducted essentially as in the past, should not constitute a long-term detrimental effect upon life styles, land use patterns or ecosystems in the Saxon Harbor area.

7.03 Localized short-term releases of potential contaminants to the open waters of Lake Superior may have occurred in the past during disposal of material dredged from the harbor, however, no apparent long-term damage to any ecosystem has resulted from past dredged material disposal methods. Evolving knowledge and appreciation of the potential long-term cumulative detrimental effects upon ecosystems and water quality resulting from the contaminants contained in the dredge material requires consideration and application of new disposal methods.

7.04 Continued Corps maintenance of Saxon Harbor, while resulting in irretrievable short-term uses and commitments of resources and temporary disruption of activity and benthic species within the project area, will respect Lake Superior water quality maintenance requirements and will allow the existence of harbor-related land use and lifestyle options for present and future generations in the Saxon community and surrounding South Shore area.

8.00 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

8.01 Breakwater Maintenance. Saxon Harbor breakwaters are constructed of sheet piling rock and concrete. All of the materials that go into either the construction or maintenance of any Corps of Engineers harbor structures may be considered as permanently and irretrievably committed. All fuels and lubricating oils used by construction and maintenance machinery also constitute irretrievable commitments of natural resources.

8.02 Maintenance Dredging. The operation of dredging equipment, tugboats, tenders and other maintenance craft results in consumption of various quantities of petroleum products in relation to the frequency and duration of the maintenance dredging operations. All funds, fuel and manpower involved during maintenance dredging operations constitutes an irretrievable commitment of natural resources.

Dredge Material Disposal.

8.03 As Beach Nourishment. At various times in the past, dredged material has also been used as beach nourishment. Material used for beach nourishment represents a wise recycling of a valuable natural resource, but the benefits derived may be of a short-term nature.

8.04 On-Land Disposal for Landfill. All of the material removed in order to create Saxon Harbor was utilized as a construction resource in either the harbor breakwaters or in final landscaping of the area. Some of the material from future dredging operations could be used within the immediate Saxon Harbor area and low areas.

8.05 As a Construction Resource. Some of the material could be used by Iron County as repair and construction material on Iron County roads. Although this represents an irretrievable commitment of resources, it also represents a wise utilization of resources.

8.06 Long-Term Commitments of Resources. Certain irreversible and irretrievable commitments of resources associated with Saxon Harbor maintenance and future dredge material disposal must be viewed in light of the long-term public good, public need and public safety afforded by a harbor in this location.

8.07 Corps of Engineers maintenance activity in Saxon Harbor permits both recreational boating and commercial sport fishing activity to be pursued by those persons who have chosen Saxon Harbor as their home port. In addition, the harbor-of-refuge along Wisconsin's south shore will remain viable.

9.00 COORDINATION

9.01 This report was drawn partially from an environmental impact assessment prepared by National Biocentric, Inc., under contract with the Corps of Engineers. Michigan Technological University, Houghton, Michigan, is presently under contract to the Corps of Engineers, to study the shoreline processes at Saxon Harbor. Some of their data has been incorporated into this report.

9.02 Many meetings were held with National Biocentric, Inc., and its subcontractor, the University of Minnesota, Duluth; Michigan Technological University, Houghton; to determine the scope and contents of the assessment and to ensure adequate coverage of all Corps functions and their effects on Saxon Harbor.

9.03 During the weeks 9-13 and 16-19 of July, 1974, representatives of National Biocentric, Inc.; the Corps of Engineers, St. Paul District; the Environmental Protection Agency; the Bureau of Sport Fisheries and Wildlife; the Minnesota Pollution Control Agency; the Minnesota, Wisconsin and Michigan Department of Natural Resources; as well as local administrative officials and interested parties, participated in a tour of all harbors on Lake Superior which are within the jurisdiction of the St. Paul District of the Corps of Engineers. The purpose of the tour was to familiarize the representatives of interested Federal, State and local governments and of the contracting agencies who were carrying out technical studies on specific harbors, with all of the harbors and the problems involved, in dredging, material disposal and general maintenance of such harbors.

10.00 CONCLUSIONS

10.01 Based on the information contained in this assessment, I conclude that the continued operation and maintenance of Saxon Harbor is important to the health, safety, and social well-being of the residents of the local area and other persons utilizing the facility as a harbor-of-refuge.

10.02 The adverse impacts of operation and maintenance activities are generally short-term in nature and the social benefits resulting from the project far outweigh these short-term effects.

10.03 The proposed action will not result in the displacement of any persons or in the loss of any known cultural or natural resources. However, should any be found during dredging and harbor maintenance activities they will be recorded and preserved.

10.04 Attention will continue to be given to preventing, controlling, and removing any fuel spillage or oil slicks caused by dredging and harbor maintenance activities. Efforts will continue to be made to avoid spillage of sediment back into the harbor during dredging, loading, and unloading of scows, cleaning of scows, and related activities.

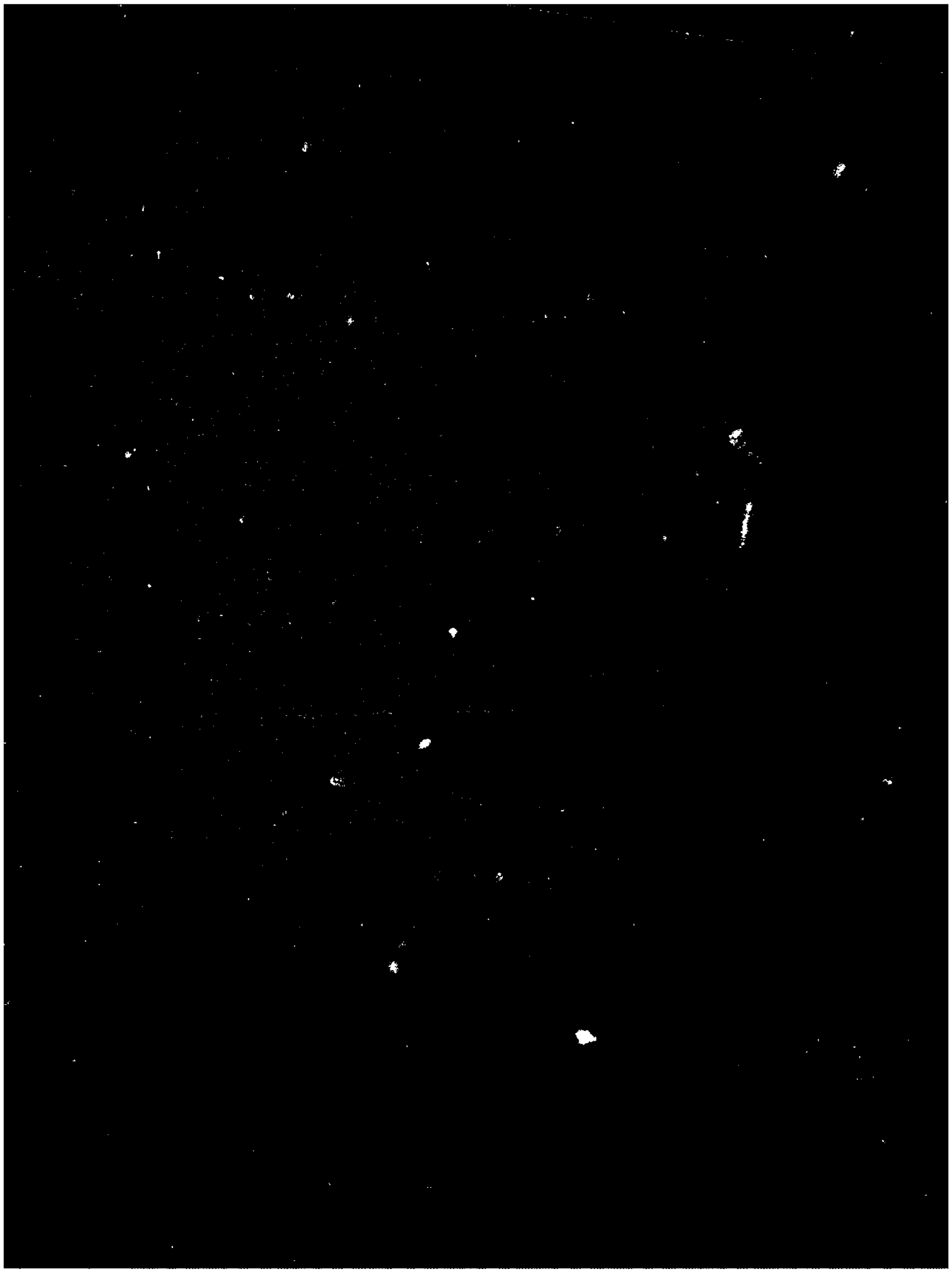
10.05 Maintenance activities will continue to be coordinated with the Wisconsin Department of Natural Resources.

10.06 The environmental review by this office has indicated that the proposed action will not have a significant impact on the quality of the human environment.

10.07 Therefore, I conclude that these activities do not constitute a major Federal action which will significantly affect the quality of the human environment and it is my decision that an environmental impact statement will not be prepared.

29 May 1975

MAX W. NOAH
Colonel, Corps of Engineers
District Engineer



TECHNICAL APPENDIX
ENVIRONMENTAL ASSESSMENT REPORT
SAXON HARBOR, WISCONSIN
LAKE SUPERIOR

TABLE OF CONTENTS

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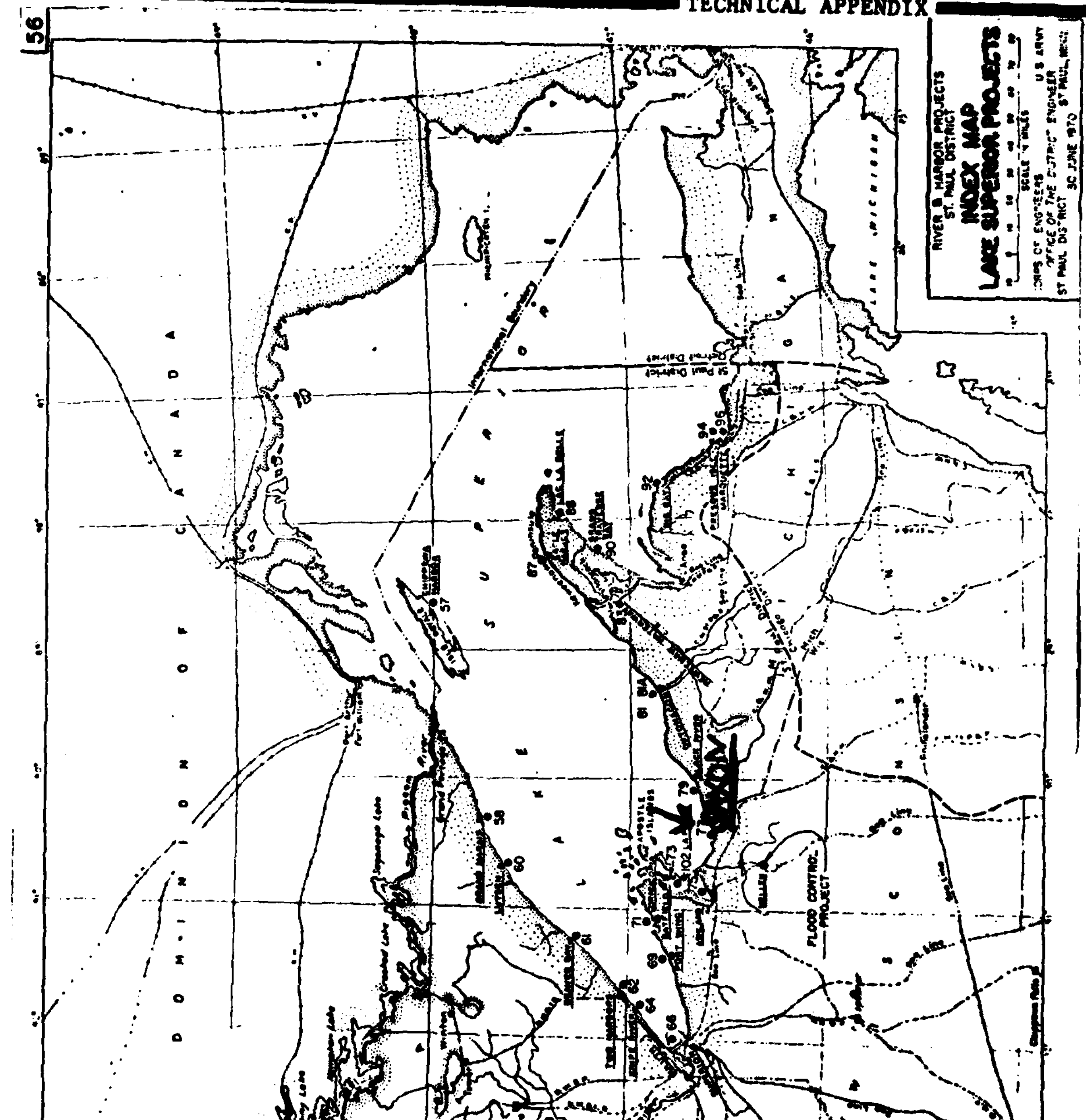
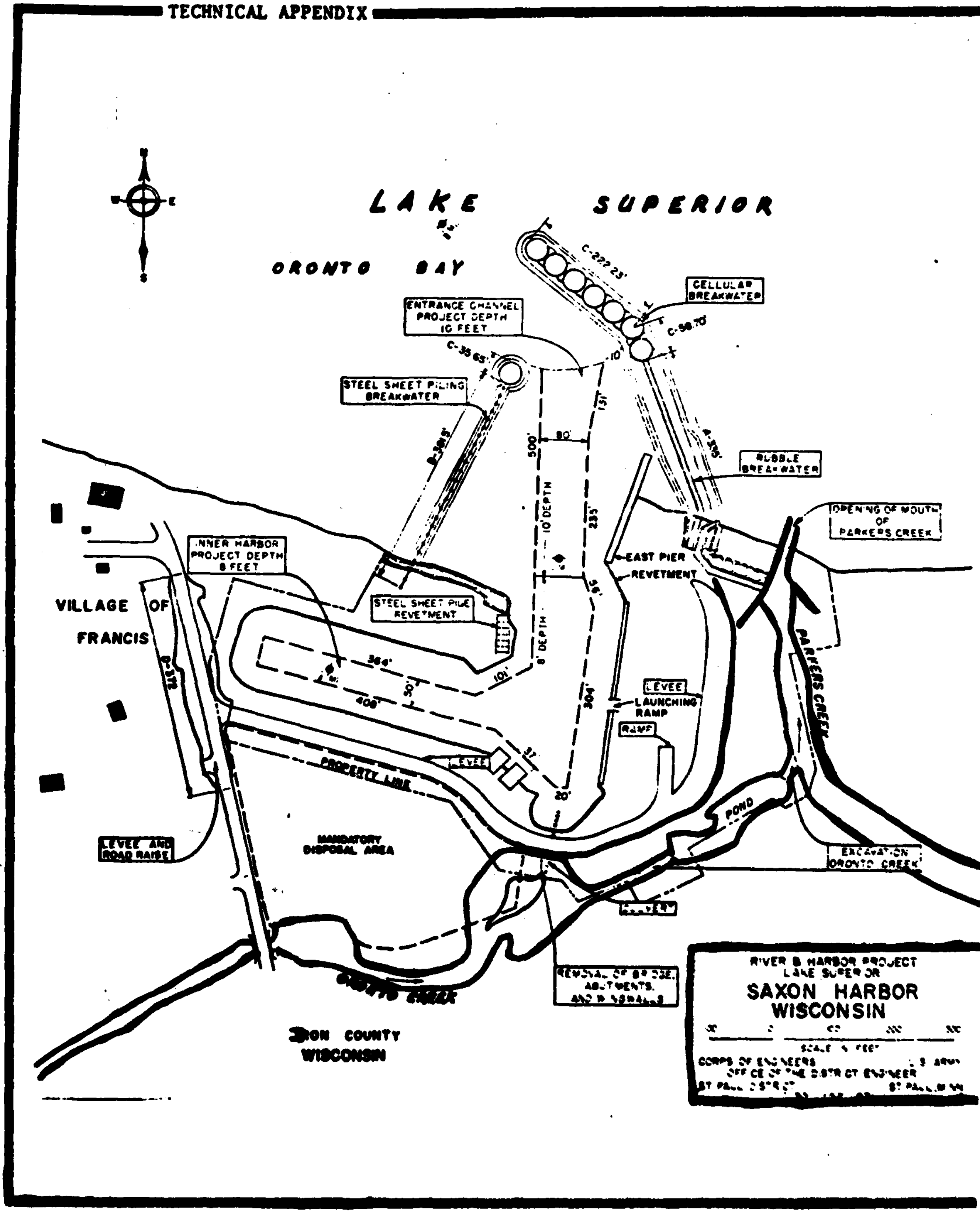

56
RIVER & HARBOR PROJECTS
ST. PAUL DISTRICT
INDEX MAP
LAKE SUPERIOR PROJECTS
DOMINION OF CANADA
LAKE SUPERIOR
FLOOD CONTROL PROJECT

EXHIBIT 1



LAKE SUPERIOR
ORONTO BAY
ENTRANCE CHANNEL PROJECT DEPTH 10 FEET
CELLULAR BREAKWATER
STEEL SHEET PILING BREAKWATER
RUBBLE BREAKWATER
OPENING OF MOUTH OF PARKERS CREEK
INNER HARBOR PROJECT DEPTH 8 FEET
STEEL SHEET PILE REVETMENT
EAST PIER REVETMENT
VILLAGE OF FRANCIS
10' DEPTH
8' DEPTH
LEVEE
LAUNCHING RAMP
RAMP
PROPERTY LINE
MANDATORY DISPOSAL AREA
LEVEE AND ROAD RAISE
POND
PARKERS CREEK
EXCAVATION ORONTO CREEK
ORONTO CREEK
COUNTY
WISCONSIN
RIVER & HARBOR PROJECT
LAKE SUPERIOR
SAXON HARBOR
WISCONSIN

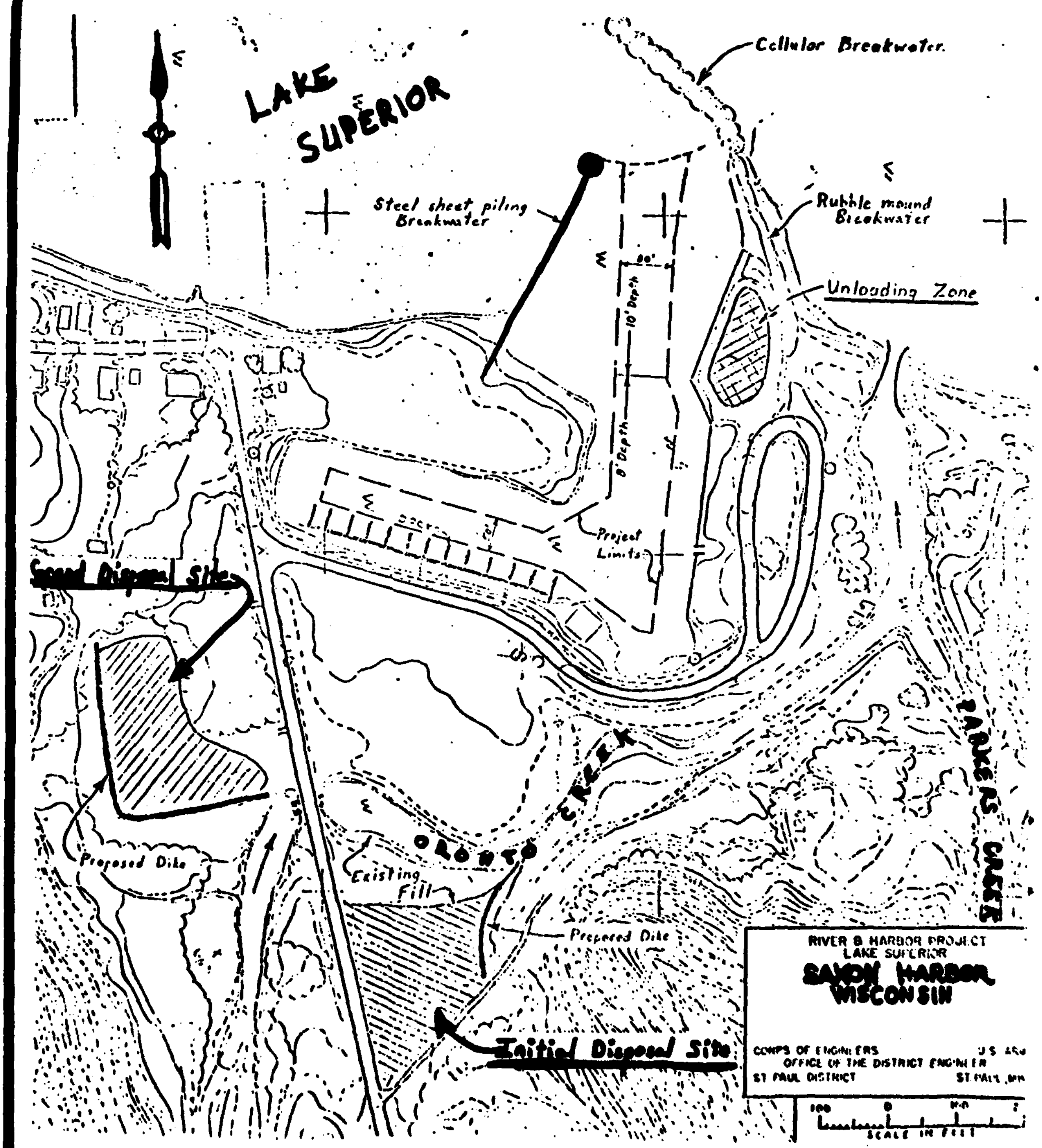
EXHIBIT 2

Summary of Corps of Engineers activity from 1958 until 1972

Year	Event Description	Cu. yds. removed	$ New	$ Maint.
to 1950	No work at this locality by Army Corps of Engineers.			
1958	Authorization for construction of break-water, inner basin and side channel and diversion of Oronto Creek to Parker Creek.			
1959	No work			
1960	Preconstruction planning		$15,509	
1961	Planning continued		10,683	
1962	Completed planning		5,808	
1963-1964	No work			
1965	Channel excavations	43,000	170,989	
1966	Contract for construction completed		222,507	$1,930
1967	Dredge, Oronto-Parker Channel widened, W.pier removed	2,650	24,195	5,860
1968	On shore maintenance		57,816	1,834
1970	Reinforce West breakwater			9,604
1971	Surveys, dredging, breakwater repair	8,950		51,718
1972	Shoreline study, dredging, repairs	3,875		35,934
	Total cubic yards removed:	58,475		
	Total itemized costs		507,507	106,880
	Total costs FY 1972		617,356	

SOURCE: Daily Computation Sheets Dredging Operations, USACE to 1950.

EXHIBIT 3



LAKE SUPERIOR
Cellular Breakwater
Steel sheet piling Breakwater
Rubble mound Breakwater
Unloading Zone
80'
10' Depth
8' Depth
Project Limits
Second Disposal Site
Proposed Dike
Existing Fill
ORONTO CREEK
PARKERS CREEK
Proposed Dike
Initial Disposal Site
RIVER B HARBOR PROJECT
LAKE SUPERIOR
SAXON HARBOR
WISCONSIN
CORPS OF ENGINEERS
OFFICE OF THE DISTRICT ENGINEER
ST PAUL DISTRICT
SCALE IN FEET

EXHIBIT 4

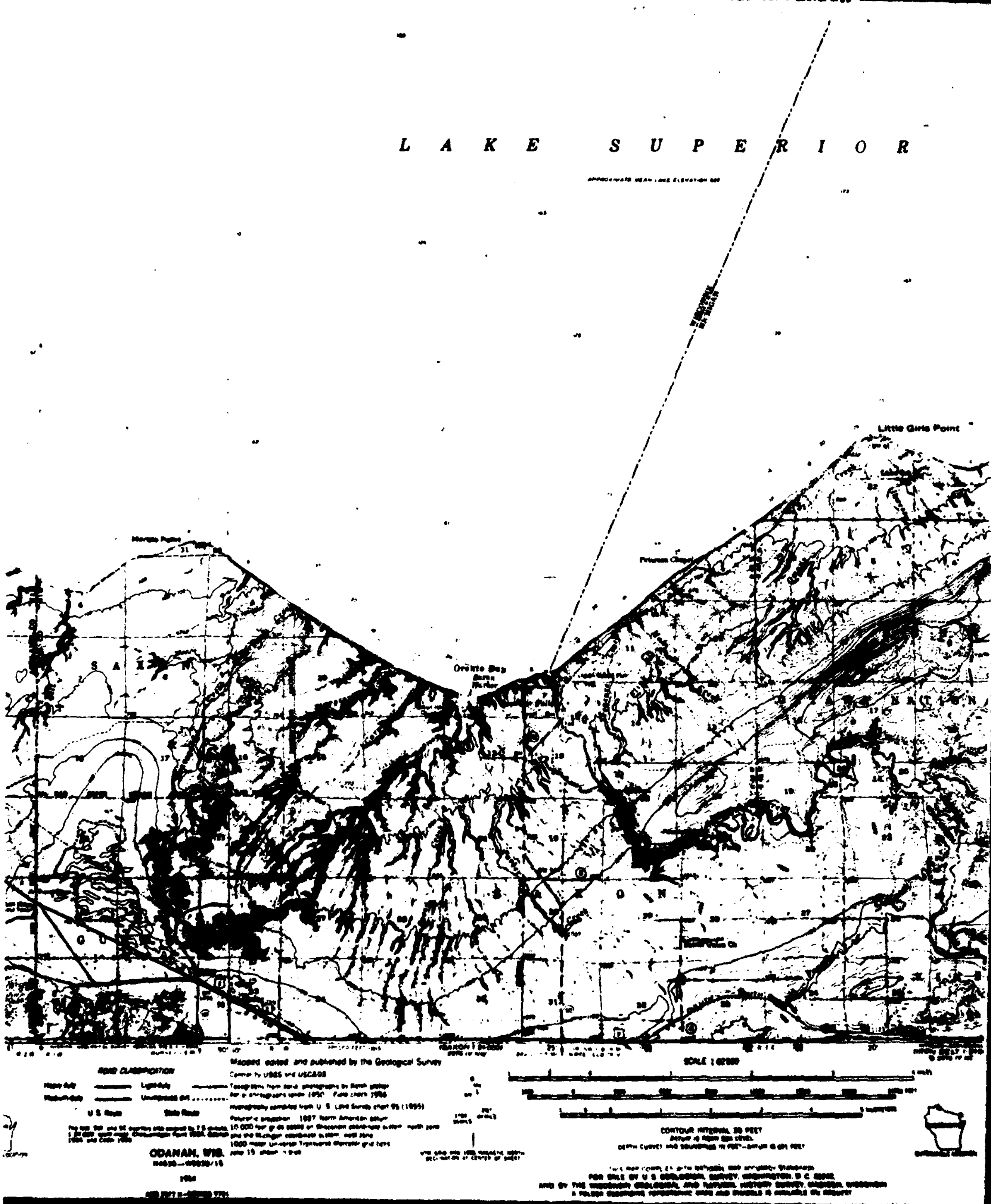

LAKE SUPERIOR
Little Girls Point
Oronto Bay
Mapped, edited, and published by the Geological Survey
SCALE 1:62500
CONTOUR INTERVAL 20 FEET
ODANAH, WIS.

EXHIBIT 5

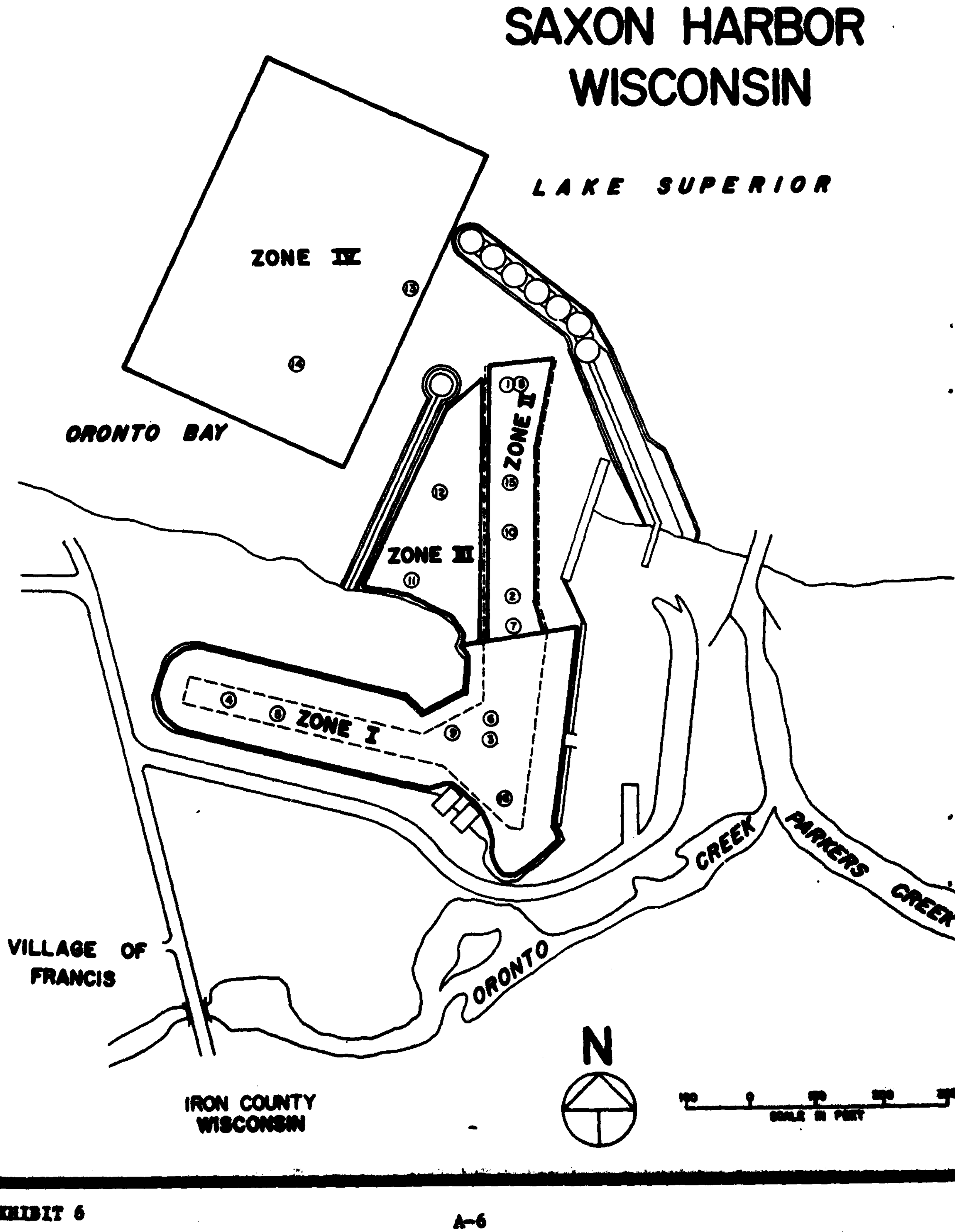

SAXON HARBOR
WISCONSIN
LAKE SUPERIOR
ZONE IV
ZONE II
ZONE III
ZONE I
ORONTO BAY
ORONTO CREEK
PARKERS CREEK
VILLAGE OF FRANCIS
IRON COUNTY WISCONSIN
N

EXHIBIT 6

Zone	Description
I	The inner portion of Saxon Harbor. The project area located inside of the natural shoreline.
II	The outer portion of Saxon Harbor. The project area located outside of the natural shoreline.
III	An area inside the harbor located to the west of Zone II. Bordered by the breakwater on the west, the shoreline on the south, and the project area on the east.
IV	The offshore area located near the entry to Saxon Harbor.

Table A-1 includes information of samples collected in the Saxon Harbor. These samples have been collected during a time period extending from 1968 to 1973 inclusive. The samples were collected by EPA and NBI.

Identification of samples collected in Saxon Harbor by EPA and NBI over a six-year time period from 1968 to 1973.

Zone	Sample Number	Sampling Agency	Date Collected
I	3	EPA	9/68
I	4	EPA	9/68
I	5	EPA	9/72
I	6	EPA	9/72
I	9	NBI	11/72
I	16	NBI	7/73
II	1	EPA	9/68
II	2	EPA	9/68
II	7	EPA	9/72
II	8	EPA	9/72
II	10	NBI	11/72
II	15	NBI	7/73
III	11	NBI	11/72
III	12	NBI	11/72
IV	13	NBI	7/73
IV	14	NBI	7/73

RESULTS

Tables A-2 through A-5 present the water, sediment, and biological data collected during this program. The data are presented in this appendix without further analyses. The data are organized by zones in the harbor. Samples taken within each zone are summarized on separate tables.

Table A-2 contains the results of the chemical analyses of bottom sediments. These samples were collected by EPA and NBI. The samples were collected during the period 1968 to 1973, inclusive.

Table A-3 contains the results of the particle size analysis of bottom sediment samples. These samples were collected by NBI in the fall of 1972 and the summer of 1973.

Table A-4 presents the results of the benthic studies relating to organisms in the bottom sediment samples collected by NBI. These samples were collected in the fall of 1972 and the summer of 1973. All samples were analyzed by staff members of UWS.

Table A-5 deals with the detailed results of the water quality analyses on water samples collected by NBI in the fall of 1972 and the summer of 1973.

Table	Identification
A-2	Chemical analyses of bottom sediments.
A-3	Particle size analyses of bottom sediments.
A-4	Benthic organisms analyses of bottom sediments.
A-5	Water quality analyses.

Evaluation Parameters	ZONE II SAMPLE 1	2	7	8	10	15
% Volatile Solids	3.7	3.5	--	--	5.1	9.2
Oil & Grease (mg/kg)	585	690	--	--	17	5,380
C.O.D. (mg/kg)	31,300	28,600	--	--	47,300	140,000
T. Nitrogen (mg/kg)	1,110	1,080	--	--	1,100	2,210
T. Phosphorus (mg/kg)	466	380	--	--	44	404
pH	--	--	--	--	--	6.1
Arsenic (mg/kg)	--	--	--	--	--	--
Cadmium "	--	--	--	--	--	7.60
Copper "	16.00	17.00	--	--	44.60	19.40
Lead "	14.00	53.00	--	--	9.50	8.60
Mercury "	--	--	--	--	.10	.10
Zinc "	45.00	44.00	--	--	47.30	47.80

Table A-2. cont. Laboratory results of analysis on bottom sediment collected by EPA and NBI in Saxon Harbor.

Evaluation Parameters	ZONE III SAMPLE 11	12
% Volatile Solids	.7	.7
Oil & Grease (mg/kg)	--	327
C.O.D. (mg/kg)	4,190	23,500
T. Nitrogen (mg/kg)	409	512
T. Phosphorus (mg/kg)	133	88
pH	--	--
Arsenic (mg/kg)	--	--
Cadmium "	--	--
Copper "	<.10	7.70
Lead "	27.00	28.70
Mercury "	.21	.17
Zinc "	99.40	22.20

Table A-2. cont. Laboratory results of analysis on botton sediments collected by EPA and NBI in Saxon Harbor.

Evaluation Parameters	ZONE IV SAMPLE	
	13	14
% Volatile Solids	.5	.5
Oil & Grease (mg/kg)	1,190	2,120
C.O.D. (mg/kg)	2,810	2,680
T. Nitrogen (mg/kg)	146	218
T. Phosphorus (mg/kg)	531	897
pH	7.0	6.8
Arsenic (mg/kg)	.10	1.70
Cadmium "	6.00	7.00
Copper "	7.20	10.20
Lead "	2.00	2.20
Mercury "	.20	.40
Zinc "	138.70	31.20

Table A-2. cont. Laboratory results of analysis on bottom sediments collected by EPA and NBI in Saxon Harbor.

Evaluation Parameters	ZONE I SAMPLE 3	4	5	6	9	16
% Volatile Solids	29.6	.6	3.2	3.4	3.8	19.0
Oil & Grease (mg/kg)	9,640	65	700	300	134	7,280
C.O.D. (mg/kg)	7,000	1,520	23,800	23,400	22,200	115,000
T. Nitrogen (mg/kg)	6,200	335	1,200	1,400	669	2,580
T. Phosphorus (mg/kg)	677	170	<2	<2	201	1,550
pH	--	--	--	--	--	6.4
Arsenic (mg/kg)	--	--	--	--	--	4.80
Cadmium "	--	--	--	--	--	8.70
Copper "	62.00	35.00	--	--	41.40	14.40
Lead "	108.00	12.00	<20.00	<20.00	21.80	9.20
Mercury "	--	--	<.10	<.10	.25	7.50
Zinc "	77.00	31.00	20.00	40.00	36.40	55.40
⋮						

Table A-2. Laboratory results of analysis on bottom sediments collected by EPA and NBI in Saxon Harbor.

Table A-3. Results of particle size distribution analysis of bottom sediment samples collected from Saxon Harbor. Samples were collected and analyzed by NBI in 1972 and 1973.

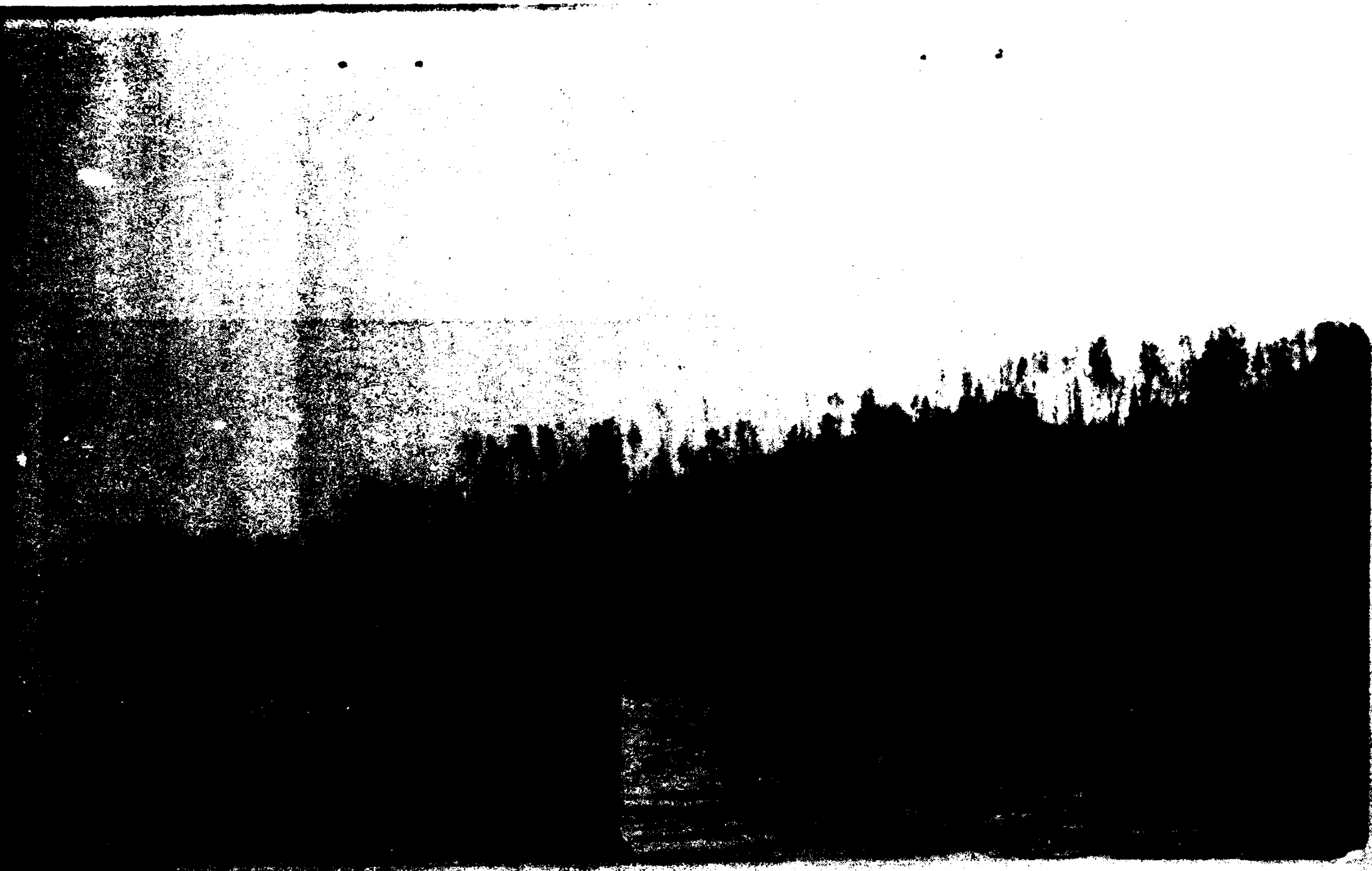
		Particles and Sieve Size				
		Sand			Silt, Clay	
Zone	Sample	<30	100	230	330	>330
I	9	3.3	45.7	20.7	27.6	2.7
I	16	0	8.9	62.4	25.8	2.9
II	10	20.9	18.6	14.2	42.0	4.3
II	15	.1	57.3	29.5	11.1	2.0
III	11	-	-	-	-	-
III	12	9.1	47.5	20.7	15.6	7.1
IV	13	.4	77.5	18.1	3.4	.6
IV	14	.2	73.9	21.3	4.2	.4

Zone	Sample	Species		Number of Organisms Per Dredge (529 cm²)	Diversity Index
I	9	Anchytarsus		2	
		Chironomus		2	
		Hexagenia		1	
		Tubifex		17	
			Total	22	1.12
	16	Valvata		1	
		Physa		1	
		Sphaerium		1	
		Statoblast		1	
			Total	4	2.00
II	10	Anchytarsus		5	
		Hyalella		1	
		Annelida		26	
		Tubifex		21	
		Statoblast		1	
		Hyalinella		1	
			Total	55	1.67
	15	No Organisms		0	0.00
III	11	Anchytarsus		1	
		Chironomus		2	
		Polypedilum		2	
		Constempillina		3	
		Asellus		1	
		Annelida		86	
		Tubifex		4	
		Sphaerium		1	
			Total	100	.95
	12	Phylocentropus		1	
		Annelida		2	
		Tubifex		2	
			Total	5	1.52
IV	13	No Organisms		0	0.00
	14	Planorbula		1	0.00

Table A-4. Results of benthic organism analyses of bottom sediment samples collected from Saxon Harbor during 1972 and 1973. Analyses were conducted by UWS staff.

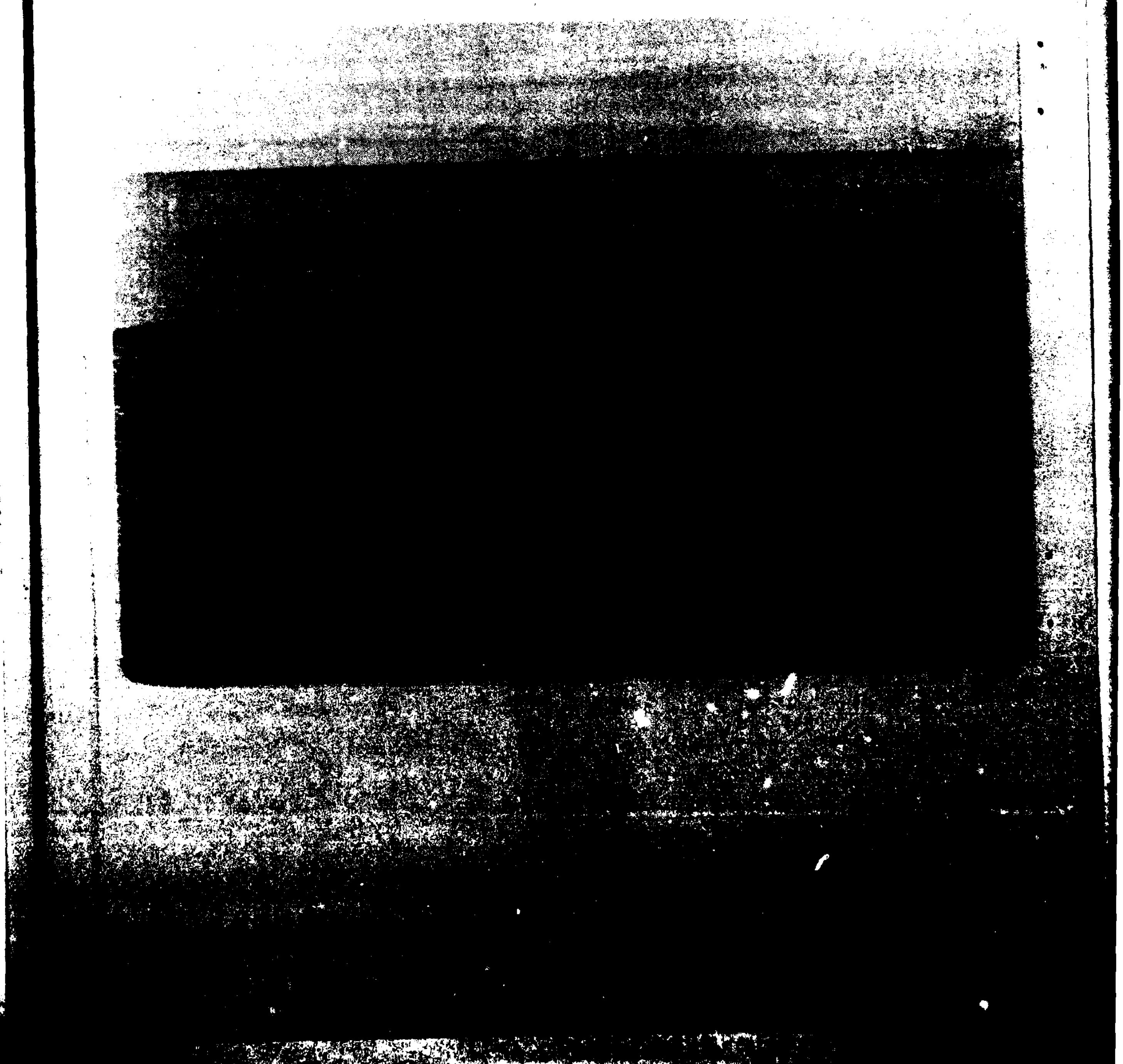
Zone	Sample	D.O. ppm	Temp. °C	pH	Turb. JTU	Cond. µ mhos	Alk. ppm	TKN ppm	TP ppm
I	9	-	4.0	7.4	16.0	67	86	.600	1.510
I	16	9.5	16.0	8.3	36.0	90	59	1.730	.099
II	10	-	4.0	7.3	16.0	62	74	.538	1.960
	15	9.6	16.0	8.3	1.7	90	60	1.230	.001
III	11	-	4.0	7.4	15.0	60	114	.462	1.010
	12	-	4.0	7.4	14.0	61	80	.473	.754
IV	13	9.6	16.0	8.2	1.5	95	55	1.810	1.800
	14	9.6	16.0	8.3	.8	95	57	.014	.001

Table A-5. Results of water quality analysis of Saxon Harbor. Water samples were collected by NBI in 1972 and 1973.



Shoreline Erosion West of Saxon Harbor

Blockage of Creek October, 1974



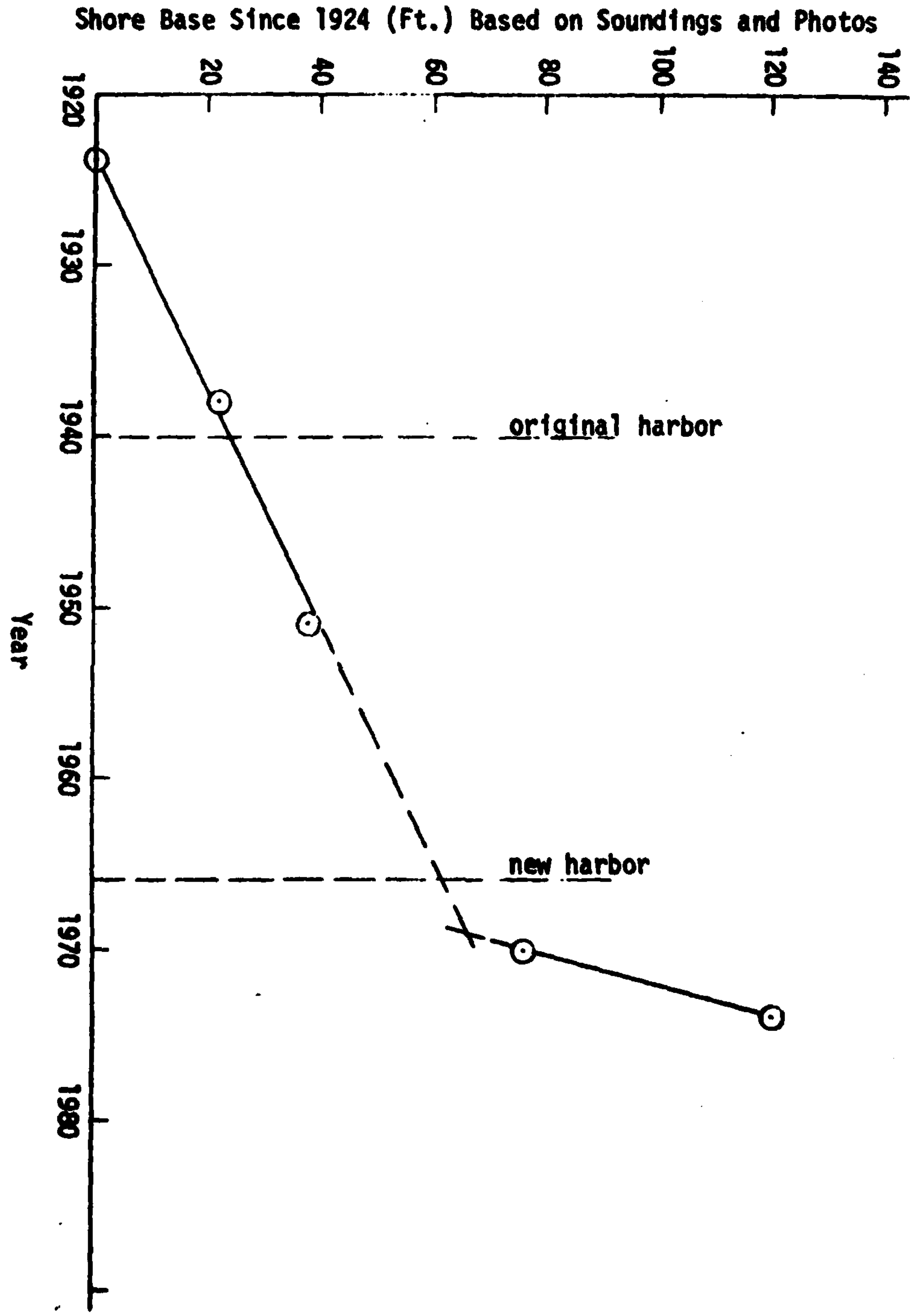


FIGURE 9. SHORELINE EROSION 500 FEET WEST OF SAXON BREAKWATER.

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

FEB 20 1975

Colonel Max W. Noah
District Engineer
Department of the Army
St. Paul District
Corps of Engineers
1210 U.S. Post Office and
Custom House
St. Paul, Minnesota 55101

Dear Colonel Noah:

Enclosed for your information is our most recent data and findings concerning the bottom sediment analysis of Black River Harbor, Michigan; Saxon Harbor, Wisconsin; and the Keweenaw Waterway, Michigan. These surveys are supplements to the reports that were previously sent to you on bottom sediment analysis of all Lake Superior harbors. As we obtain additional data on Lake Superior harbors, we will send you the necessary information to help you keep your reports up to date.

The following is our official classification of these three harbors:

Black River Harbor

One sample collected in this harbor during our 1974 sediment sampling survey had marginally excessive concentrations of % volatile solids, COD and TKN. All other samples indicated completely unpolluted conditions. There are no major dischargers in the area, and pumpout facilities are available for the small crafts that use this project. In light of this, it is our opinion that the marginal violations are attributable to natural background conditions. Based on the chemical and biological analyses as well as field observations, we have determined that all material dredged from this Federal project is acceptable for open lake disposal.

Saxon Harbor

One sample which we collected near the mouth of this harbor during our 1974 sediment survey had marginally excessive concentrations of % volatile solids, COD and TKN. Review of the field report

- 2 -

shows a significant amount of organic detritus which probably caused this violation. As in the case of Black River Harbor, this is a small boat harbor with no major dischargers in the area and pumpout facilities are available. Therefore, based on chemical and biological analyses, as well as field observations, we have determined that all material dredged from this Federal project is acceptable for open lake disposal.

Keweenaw Waterway

As we stated in our letter to you of November 11, 1974, any material dredged from mile point 0.0 to mile point 2.5 is acceptable for open water disposal. A study conducted by Michigan Technological University showed that the marginally high concentrations of zinc found in this project is a result of material from stamp sands being carried by the littoral drift along the shore of Lake Superior and deposited in the waterway. This accounts for the overall even distribution of the zinc in this project.

In all cases, we expect that the open lake deposition of dredged material will occur at the designated site.

We hope this information will prove beneficial in your planning of maintenance operations. If we can be of further assistance, please feel free to contact us.

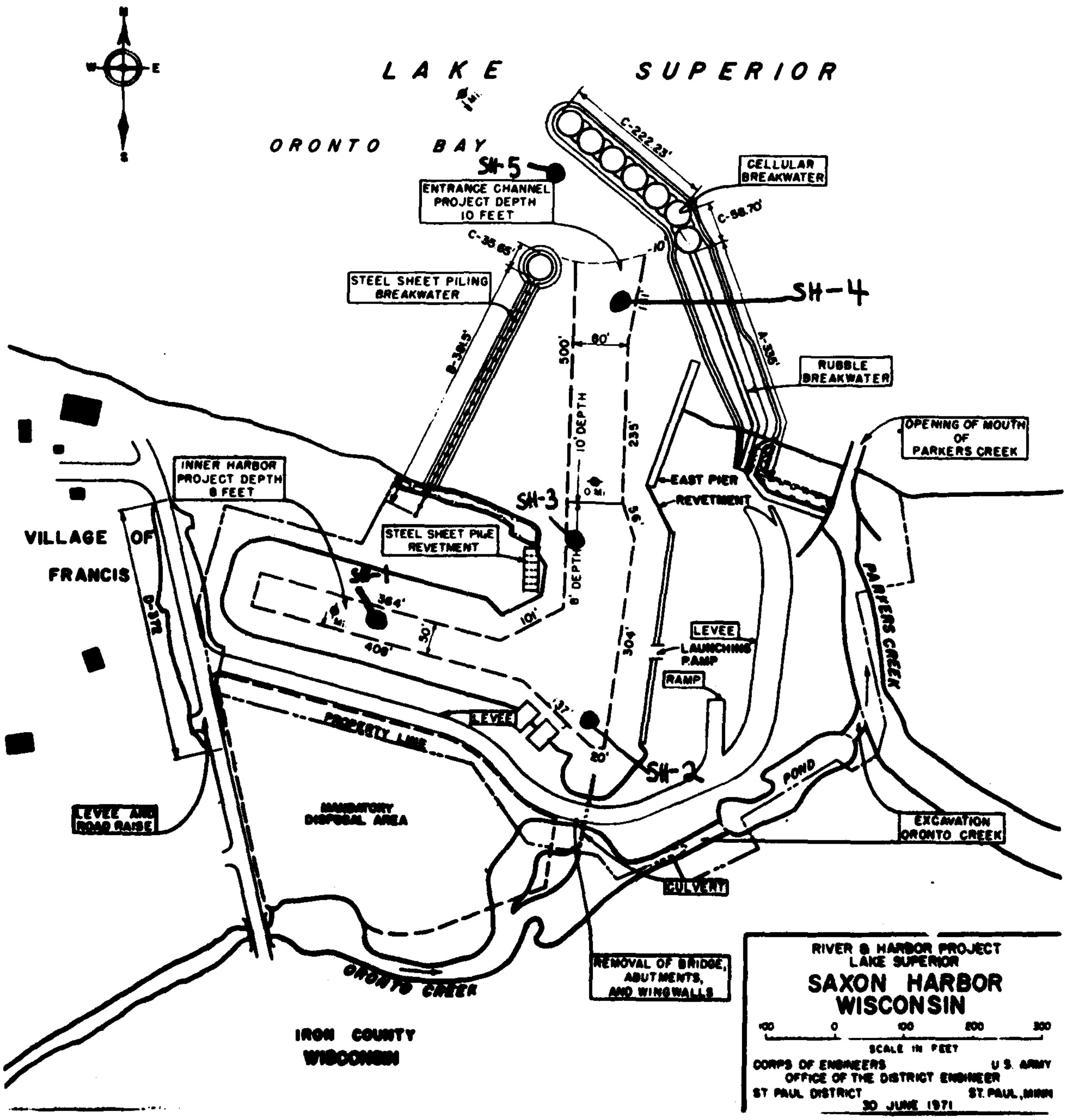
Sincerely yours,

Christopher M. Timm, Acting Director
Surveillance and Analysis Division

CC: Brig. General W.O. Bachus
Donald Wallgren
Dale Granger
NWDO
Michigan DNR
Wisconsin DNR

Great Lakes Surveillance Branch

1974 Sediment Sampling Station



FIELD REPORT

Harbor: Saxon Harbor
State: Wisconsin
Sampled: September 26, 1974

Sample or station No.	Location	Depth	Observations
SH-1	46° 33' 42.0" 90° 26' 20.2"	10 feet	Reddish brown material. Mostly silt. Mucky consistency. Some aquatic plants and organic detritus. Very slight odor (unidentified). Oil sheen observed on sample. Organisms; blood worms, sludge worms, caddis fly larve, unidentified larve.
SH-2	46° 33' 40.8" 90° 26' 16.0"	9.5 feet	Reddish brown material. Mostly silt. Mucky consistency. Some organic detritus (wood chips). No odor detected. Organisms; blood worms, caddis fly larve, small snail.
SH-3	46° 33' 43.3" 90° 33' 16.3"	10 feet	Reddish brown material. Mostly silt. Hard packed muck. Aquatic plants and some organic detritus. No odor detected. Organisms; blood worms, sludge worms, finger nail clams.
SH-4	46° 33' 46.8" 90° 26' 15.3"	11.5 feet	Reddish brown material. Some silt, some sand, a lot of organic material to include pieces of wood, leaves, and twigs. Slight earthy odor. Organisms; blood worms.
SH-5	46° 33' 48.6" 90° 26' 16.5"	14 feet	Reddish brown material. Mostly fine sand. Small amount of organic detritus. No odor. Some organisms observed.

SEDIMENT POLLUTION EVALUATION

Harbor: Saxon Harbor
State: Wisconsin
Sampled: September 26, 1974

Evaluation parameters	Max. acceptable values (%)	Value at each station as a percent of dry weight				
		SH-1	SH-2	SH-3	SH-4	SH-5
Volatile solids	6.0	3.0	3.5	2.9	7.3	0.5
Chem. oxy. demand	5.0	2.5	3 .6	2.9	9.1	.2200
T. Kjel. nitrogen	0.10	0.0780	0.1200	0.0710	0.1100	0.0019
Oil-grease	0.15	0.0370	0.0500	0.0450	0.1000	0.0190
Mercury	0.0001	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00001
Lead	0.005	0.0018	0.0017	0.0013	0.0014	0.0008
Zinc	0.005	0.0047	0.0049	0.0047	0.0032	0.0026
Supplementary:						
Arsenic		0.0003	0.00022	0.0003.0	0.00019	0.00013
Cadmium		0.0004	0.0003	0.0004	0.0004	0.0003
Chromium		0.0024	0.0027	0.0017	0.0023	0.0094
Copper		0.0011	0.0010	0.0018	0.0010	0.0023

SAXON HARBOR, WISCONSIN

MACROINVERTEBRATES

Organisms	Stations SH-1	SH-3
DIPTERA		
Chironomus sp.	17	35
Cryptochironomus sp.	4	3
Tribelos sp.	1	
Potthastia sp.	1	
Procladius sp.	1	3
Tanytarsini		1
TRICHOPTERA		
Phylocentropus sp.	9	2
OLIGOCHAETA		
Limnodrilus sp.	6	1
Peloscolex Variegatus		3
ISOPODA		
Ascellus Occidentalis	2	2
AMPHIPODA		
Ponteporria Affinis		1
Hyollela Azteca		2
GASTROPODA		
Physa sp.		1
Amnicola sp.		2
Total No. of Organisms	41	56
Total No. of taxa	8	12
Diversity Index	2.3	2.2

NCSED-ER 24 January 1975

Dr. Joan E. Freeman
State Archaeologist
816 State Street
Madison, Wisconsin 53706

Dear Dr. Freeman:

We are now in the process of preparing a draft environmental impact statement for the operation and maintenance and harbor related erosion in Saxon Harbor, Iron County, Wisconsin.

In general, the statement will discuss the environmental impacts of the Corps of Engineers actions necessary to maintain and operate the harbor. This involves normal breakwater repair and maintenance dredging, which are performed as needed. The estimated average annual maintenance required to maintain project depths is approximately 6,000 cubic yards based on a 3-year frequency of dredging. Plans are to dispose of dredge material from Saxon Harbor in the open lake or near shore for beach nourishment.

In compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, we are requesting your comments concerning the existence of any historical, archaeological and paleontological resources which may exist in the vicinity of Saxon Harbor and which may be affected by operation and maintenance activities in the harbor.

The draft environmental impact statement is scheduled for completion in May 1975, and a copy will be furnished you at that time.

If we can be of any further assistance, please contact us.

Sincerely yours,

NORMAN C. HINTZ
Major, Corps of Engineers
Acting District Engineer

2 Inclosures
1. List of those receiving identical letters
2. Map of Saxon Harbor

THE STATE HISTORICAL SOCIETY OF WISCONSIN

816 STATE STREET / MADISON, WISCONSIN 53706 / JAMES MORTON SMITH, DIRECTOR

State Historic Preservation Office

February 28, 1975

Colonel Max W. Noah, District Engineer
St. Paul District, Corps of Engineers
1210 U.S. Post Office and Custom House
St. Paul, Minnesota 55101

SHSW 0024-75

Dear Colonel Noah:

Reference your January 24, 1975 letter NCSED-ER concerning the operation and maintenance of Saxon Harbor, Iron County.

Other than archeological, there are no historical sites on, or eligible for, the National Register of Historical Places in the proposed project area.

However, we do note that it is proposed to deposit spoil at or near the shoreline for beach nourishment. Archeological sites are known to exist on Lake Superior beaches. If there are to be spoil deposits which will cover existing beach areas, an archeological survey of these areas must be undertaken to ensure that valuable prehistoric or historical evidence is not irretrievably obscured.

Sincerely,

James Morton Smith
State Historic Preservation Officer

JMS:cwrd

cc: Mrs. Edward Kopacz, President
Iron County Historical Society

EXHIBIT 12

United States Department of the Interior

NATIONAL PARK SERVICE
MIDWEST REGION
1709 JACKSON STREET
OMAHA, NEBRASKA 68102

IN REPLY REFER TO:

L7619 MWR CE

JAN 30 1975

Major Norman C. Hintz
Acting District Engineer
Corps of Engineers
1210 U.S. Post Office
St. Paul, Minnesota 55101

Dear Major Hintz:

In response to your request of January 24 for our comments on operation and maintenance activities in Saxon Harbor, Iron County, Wisconsin, these activities would not adversely affect any established or studied units of the National Park System or any National Landmark (natural or historic).

Sincerely yours,

John Kawamoto
Acting Regional Director